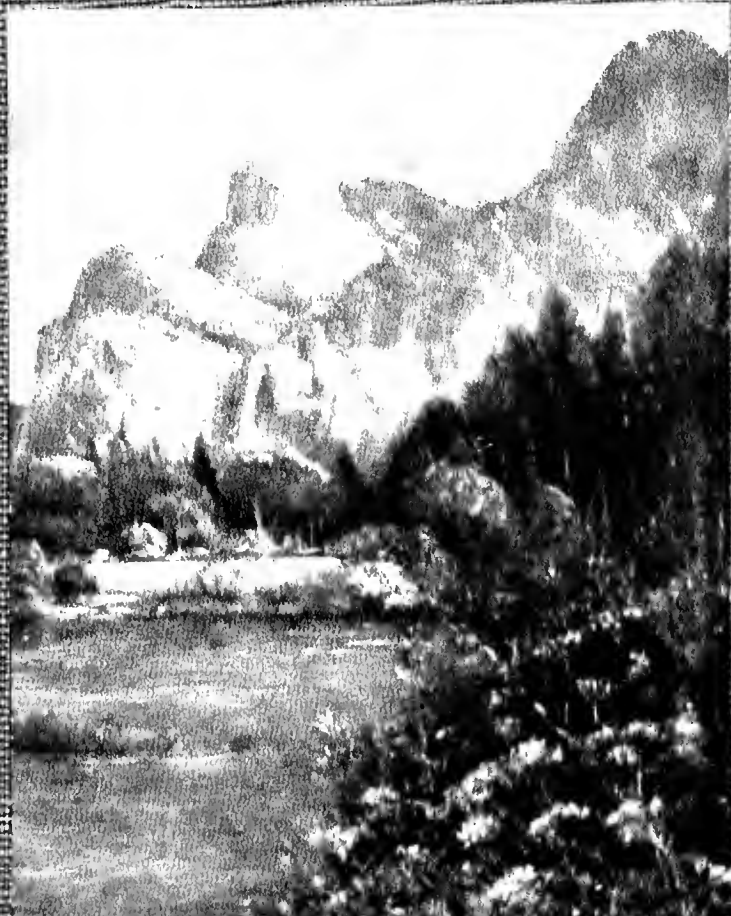


YOSEMITE

AND ITS

HIGH SIERRA



BY JOHN H. WILLIAMS



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Daybreak in Yosemite Cañon. View from Big Oak Flat Road, a thousand feet above the Merced River. Bridal Veil Fall, more than a mile away, greets the morning with its song; and, far beyond, Sentinel Dome tops the vast south wall of the Valley.

OTHER ILLUSTRATED BOOKS

BY JOHN H. WILLIAMS

“THE MOUNTAIN THAT WAS ‘GOD’”

“THE GUARDIANS OF THE COLUMBIA”

“THE CANOE AND THE SADDLE”

BY THEODORE WINTHROP

to which are now first added his WESTERN LETTERS
AND JOURNALS. Edited with an Introduction
and Notes by John H. Williams.

Here the glacier ground the stone,
Here spake God and it was done ;
Buttress, pinnacle and wall,
River, forest, waterfall,
And God's right hand over all.
Hear the mountain torrents call,
Swung colossal from the steep ;
See them, wind-tossed, wave and sweep ;
Hear them sound like harper's hands
On the quivering granite strands,—
Now with thunderous thud and moan,
Now with giant undertone ;
While the pine trees whisper low,
And the sunset's shadows slow
Up the vast gnarled ridges go
To the roseate far snow.

—*Rev. Joseph Cook: "Yosemite."*



YOSEMITE

and its HIGH SIERRA

By JOHN H. WILLIAMS

Author of "THE MOUNTAIN THAT WAS 'GOD'"

"THE GUARDIANS OF THE COLUMBIA" etc.

*"There is no death; love paid the debt;
Tho' moons may wane and men forget,
The mountain's heart beats on for aye;
Who truly loved us cannot die."*

And so I wait, not fear the tide
That comes so swiftly on to hide
My little light. The mountains glow;
I have their promise, and I know.

—Richardson: "*The Promise of the Sierra.*"

SECOND EDITION, REVISED AND GREATLY ENLARGED,
WITH MORE THAN TWO HUNDRED AND
FIFTY ILLUSTRATIONS.



SAN FRANCISCO
JOHN H. WILLIAMS

1921



"Where the Rapids Rip and Roar." A fine cascade on the McClure Fork of the Merced, below Vogelsang Pass. It has a drop of more than a hundred feet, and would be famous for its beauty anywhere else than amidst the Yosemite Park's great array of waterfalls.

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JUN 14 1921

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On the Summit of Clouds Rest, looking southeast over Little Yosemite to Mt. Clark and its fellow-peaks of the Merced Group.

TO
THE SIERRA CLUB
 THIS VOLUME ABOUT A NOBLE REGION
 WHICH IT HAS LABORED TO CONSERVE AND MAKE ACCESSIBLE
 IS CORDIALLY DEDICATED

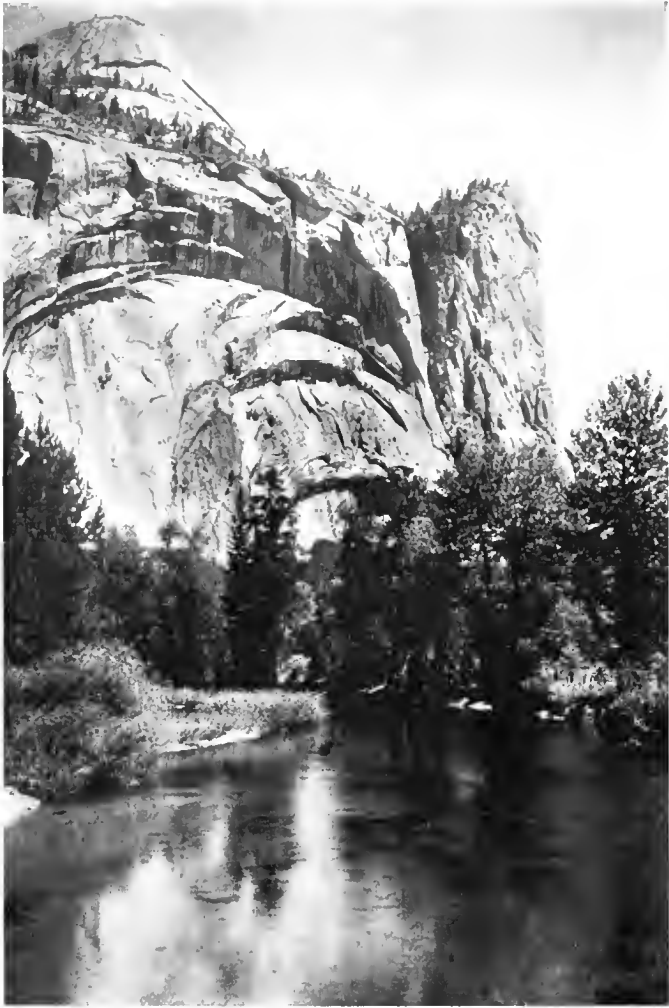
Have you gazed on naked grandeur where there's
 nothing else to gaze on,
 Set pieces and drop-curtain scenes galore,
 Big mountains heaved to heaven, which the blinding
 sunsets blazon,
 Black cañons where the rapids rip and roar?

* * * * *
 Have you seen God in His splendors, heard the text
 that Nature renders,—
 You'll never hear it in the family pew,—
 The simple things, the true things, the silent men
 who do things?
 Then listen to the Wild—it's calling you.

—Robert W. Service.



Starting for the Ascent of Mt. Lyell.



North Dome, Royal Arches and Washington Column, seen from the Merced River. The concentric formation in the granite, which is characteristic of the whole Yosemite region, is nowhere better shown. The imposing architectural aspect of this group, as if it were the ruins of some vast, decaying medieval cathedral, with crumbling arches and broken campanile, makes it one of the most interesting rock features in Yosemite Valley.



The Half Dome, with Clouds Rest beyond. View from the Overhanging Rock at Glacier Point, nearly two-thirds of a mile above the floor of Yosemite Valley.

FOREWORD

This new edition of "Yosemite and Its High Sierra" is much more than a reprint. The text has largely been rewritten, with regard to the increased facilities for visiting and exploring the Yosemite National Park, and to its fast-growing need for modern roads. An improved map of the Park showing roads, trails and landmarks; a road map showing approaches to the Park, and upwards of fifty new illustrations, have been added. Credit to each photographer is given in the table of illustrations on pp. 11-15. In expanding the fifth chapter, I aimed to give the reader some idea of the extent and beauty of the highland forests, with a representative collection of tree pictures, especially of the *Sequoia gigantea*. The final section, "Notes," offers suggestions for brief trips to the great features of the Valley and its immediate upland. This condensed guide I hope will prove helpful to the time-short visitor.

I have felt it a duty of every lover of Yosemite Valley to protest against the impending ruin of its especial beauty through Congressional neglect. Since the creation of this National Park thirty-one years ago, the Government has confined its provision for travel to and within the Park merely to taking over and maintaining inadequate roads built by private corporations. In most cases, these have not even been made fit for motor traffic. The need of roads out of the famous little Valley, which would lead the increasing throngs of summer vacationists to the broad and inviting upland near by, has long been urged upon Congress, but without result. This need became imperative when the Park Administration took the desirable step of admitting automobiles to the National Parks. Yosemite travel at once multiplied, and the already overcrowded state of the Valley is seen in Superintendent Lewis's report showing that room had to be found in the public camping grounds on the Valley floor last summer for twenty-five thousand campers.

The State of California is soon to build the last link in a great highway, skirting the Merced up from the hot San Joaquin country to Yosemite Village. This done, the tide of visitors will become an inundation, making Valley conditions unsanitary and destructive, unless Congress acts without further delay. The thousands for whom Yosemite Valley would be unspeakably impoverished by the loss of its flower fields and the mutilation of its forests should ask of Congress the immediate adoption of Mr. Lewis's program for road betterments and construction in the Yosemite Park.

This edition owes much to co-operation of Government representatives. Director Mather, of the National Park Service, kindly had the "Travel Guide Map" brought

up to date for reproduction here. Superintendent Lewis, of the Yosemite National Park, has responded to many calls for information. Messrs. Redington and Barrett, of the San Francisco office of the United States Forest Service, have enriched the book with photographs of many great trees, thus aiding me to show the important Yosemite forests more comprehensively, I think, than has hitherto been attempted. I am also deeply indebted to Miss Elizabeth Keith Pond, of Berkeley, for her courtesy in supplying the splendid series of her brother's photographs of winter mountaineering in the High Sierra, and permitting me to quote from her own letter describing their capital adventures in February.

Renewing the personal acknowledgments made in the "Foreword" of the previous edition, I quote therefrom the following paragraphs expressing my aim in this work:

"The present addition to my series about the great mountains of the West will serve a happy purpose if it does no more than to gain new readers for the splendid books on Yosemite that have preceded it. One who follows in the footsteps of J. D. Whitney, Clarence King, Galen Clark, John Muir, and Smeaton Chase must needs enter upon his task with diffidence. Nevertheless, it is largely a new work that I have undertaken, namely, to describe and exhibit, not merely the famous Yosemite Valley, but the entire Yosemite National Park, so far as may be possible, by the aid of telling pictures. The field is so vast, its mountains, cañons, lakes, waterfalls, and forests are so important and spectacular, that even the unprecedented number of illustrations given here can only suggest its riches of wonder and beauty. In order to make room for the largest number of views, I have confined my text to those matters which persons visiting Yosemite for the first time may naturally wish to know,—an outline of the great physical features of the Yosemite country and their causes, the story of its native inhabitants and their worthy but pathetically hopeless fight to hold their alpine fastness, and the increasing facilities for the enjoyment of its renowned valleys and equally inviting highlands. I shall feel it no defect in this brief essay if among my readers some *Oliver Twist* may perchance ask for more!

"The choosing of more than two hundred illustrations from many thousands of photographs involved no little labor. Much of the district was, until lately, very inadequately photographed. Yosemite Valley has long been the best illustrated scenic spot in America, but the wonderful High Sierra back of it has been surprisingly neglected by the professional photographers. Fortunately for this book, however, the large membership of the Sierra Club includes many expert amateurs, and the club's different expeditions into the mountains have produced a multitude of photographs that are equal to the best professional work. My first acknowledgment must therefore be to the photographers among my fellow-members for the unanimity with which they have placed their negatives at my disposal. Without such help, it would have been possible to show little more than the beaten paths of Yosemite Valley and the Big Tree groves. . . .

"This book is an acknowledgment of a long-standing debt to the Sierra. Years ago, while a resident of California, I became a lover of her mountains. It has since been my good fortune to study other great mountain districts, and to learn that each has its own special inspiration; but on returning to the Yosemite upland after a decade of absence, I have still found in its nobly sculptured heights and gentle valleys a peculiar and lasting charm possessed by no other wild landscape, American or European, with which I am acquainted,—a mingling of sublimity and tenderness that should make it the joy of all Americans, and the best-guarded treasure of California."

San Francisco, May 15, 1921.



Lunch Time on the Tuolumne, at the Sierra Club's Camp near Soda Springs.

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Jack Main Cañon and Wilmer Lake, north of Hetch Hetchy Valley.



Down at Tennyson Lake. In the distance (right) Cathedral Peak stands far back on its plateau. Tloga Road, after skirting the north side of the lake, follows the canon on the left, crosses a low divide at the foot of Polly Dome, now shining in the morning sun, and reaches Tuolumne Meadows, seven miles away. This lake is a favorite with campers; one may be seen cooking his breakfast on the flat below.



Hegulation Peak (el. 10,500 ft.), and Rodgers Lake, the best known of many beautiful mountain lakes in the northern part of the Park.

YOSEMITE AND ITS HIGH SIERRA

I

THE YOSEMITE NATIONAL PARK

God of the open air,

To Thee I make my prayer. . .

By the breadth of the blue that shines in silence o'er me,

By the length of the mountain lines that stretch before me,

By the height of the cloud that sails, with rest in motion,

Over the plains and the vales to the measureless ocean

(Oh, how the sight of the things that are great enlarges the eyes!),

Lead me out of the narrow life to the peace of the hills and the skies.

—*Henry Van Dyke.*

Mountains are the beginning and end of all natural scenery.

—*John Ruskin.*



THE Yosemite Country invites all lovers of the thronging mountains. It offers the enjoyment of a landscape famous for its elements of surprise and wonder. It promises the lasting interest of wild upland grandeur, softened by the beauty of flower-meadow and forest, of deep-set lakes and innumerable falling waters. A land of superlatives, it truthfully boasts the most splendid high-walled valleys, the loftiest cataracts, the oldest, stateliest, and most noteworthy trees, in the world. It multiplies the delights of mountaineering with the most equable of sunny mountain climates. Finally,—and this is its loudest call to thousands of true nature-lovers,—it presents a legible and absorbing record of the making of great scenery.

It is a commonplace of foreign visitors of the boulevard type, and of some Americans who know the towns and spas of Europe better than the glory of their own land, that the mountain scenery of Western America is

a scenery of mere savage bigness, rather than of predominant beauty. This easy complaint may be charged in good part to our modern demand for luxury, and will be forgotten with the multiplication of automobile roads and expensive hotels. A fashionable inn on its summit, with ease of access, has made many a third-rate hill in Europe the goal of spell-bound tourists,

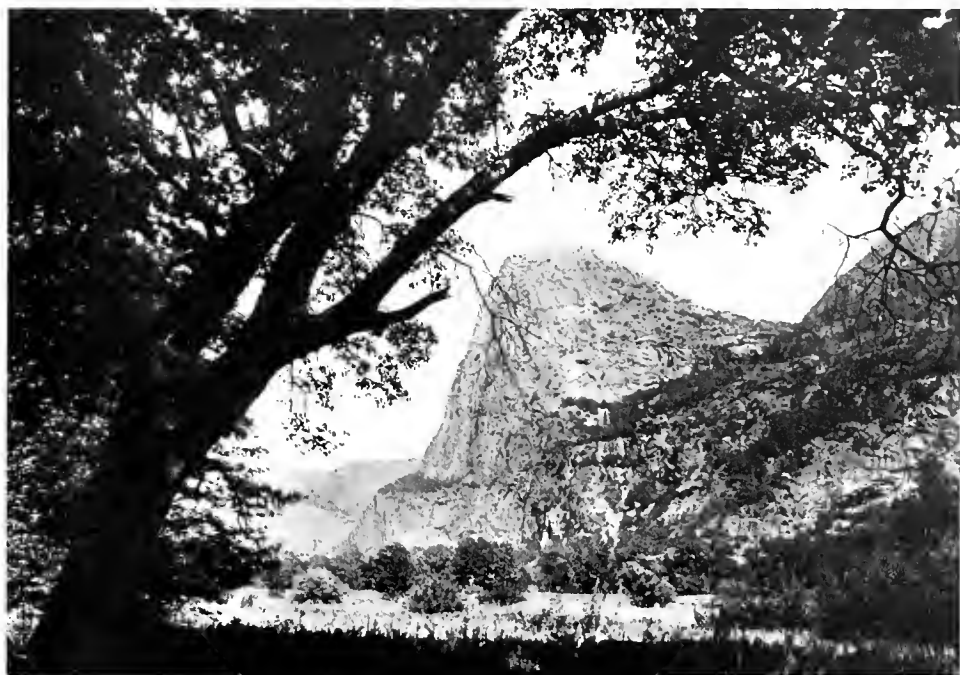


Sentinel Rock, seen from east and west,—the great glacier-carved cliff rising 3,086 feet on the south side of Yosemite Valley, opposite Three Brothers. The perpendicular front of the Sentinel, sheer for half its height, shows how the cleavage has followed vertical jointing in the granite.

including droves of our globe-trotting fellow-countrymen. Nevertheless, the trite criticism has in it a half-truth. It is true of the Rocky Mountain and Sierra systems to the same extent that it is true of the bleak Swiss plateaus supporting the great snow-peaks, or the Tyrolese uplands,

or the cirque country of the Pyrenees. The beauty of such scenes is not to be measured on the scale of country estates and well-trimmed pastoral landscape, among the hills of older regions.

High mountain lands but lately abandoned by ice-sheet and glacier wear similar aspects the world over. They are the seats of sublimity rather than of the picturesque. Their fascination lies not so much in softness of detail as in breadth of view, in strength of line and majesty of form. They conjure with a story of their master sculptor, the Sun, wield-



Hetch Hetchy as It Was. The Oaks are gone, and the noble Valley is soon to become a beautiful Lake, storing water for San Francisco. The great landmark, Kolana Rock, corresponds in its position on the south wall with Sentinel Rock in Yosemite.

ing vast tools of ice and snow and rushing torrent, to block out peak and range, to lay broad glacial valleys deep with soil, to plant the highland lakes, and to smooth the wide rock benches, which, even yet unweathered, refuse welcome to forest or farm.

In such alpine regions, whether of Europe or America, the real outdoor man needs no handbook of science to interpret their report of elemental forces, busy until comparatively recent time. Nor does the wildness of the scenes, or the effort needed to attain them, weigh against the inspiration which he prizes more than comfort. He is not offended by the absence of those sylvan graces common only to the older lowlands. And if, happily, prodigal Nature, in her bounty, should set down a delightful picture of gentler beauty in the midst of her mountain grandeurs, he



A Study In Forests, Mountains, and Clouds. View east from the summit of Lambert Dome, in Tuolumne Meadows. Beginning on the left, the peaks are Dana, Gibbs and Mammmoth. The cloud scenery of the Sierra is as characteristic and impressive as its landscape. The forest, at this high level, is mainly lodgepole or tamarack pine.

appraises it the more justly for its mighty surroundings. The ancient hills, he knows, are man's oldest and unfailing friends; their service, past and present, in making the earth inhabitable calls for his tribute; and year after year finds him returning with joy to learn their lessons and receive their strength. As Maxwell Burt gaily sings,—

There is no good denying it,
If you be mountain born,
You hear the high hills calling
Like the echo of a horn;
Like the echo of a silver horn that threads the golden day,
You hear the high hills calling, and your heart goes away.

The character and accent of mountain landscape at its best distinguish



Returning from the Summit of Mt. Hoffman.

the whole of the Yosemite National Park. Its area of 1,124 square miles combines the most rugged wildness with innumerable scenes of composed beauty. Extending from an average elevation of 4,500 feet on its western boundary to the snowy summits of the Sierra Nevada Range, at more



First View of the Mt. Lyell Group, from the Lyell Fork of the Tuolumne. Mt. Lyell (13,090 ft.), with its large north-side glacier, is at right of center, with Mt. McClure still farther to the right.



A Glacial Landscape: The domes of Mt. Starr King (right), with Mt. Clark and the cirques of the Merced Range beyond, bounding the Millonette water-shed.

than 13,000 feet, it includes the watersheds of two important rivers, the Merced and the Tuolumne, and embraces a variety of upland scenery hardly equaled in any other of our national parks.

Each of these great public outing grounds has its own especial interest: the Colorado Grand Cañon, its vast gorge, with an infinite diversity in the forms and coloring of the river-sculptured rock; the Rainier Park, its single volcanic peak, imposing beyond other American mountains, crowned with its perpetual ice-sheet, and radiating a score of huge glaciers down its densely forested slopes; the Yellowstone, its wonderful thermal basins and their geysers, its lakes and cañons, all blending in an unforgettable glory of color; the new Glacier Park, like the still grander Canadian Rockies

near by, a wealth of smaller snow-peaks, glaciers, and beautiful lake-strewn valleys.

Yosemite has no geysers. Its former mighty glaciers have shrunk to a few pygmy remnants, still lurking deep in north-side head-basins on the highest peaks. But ancient ice-sheets, of which only these shadows now linger, have left the story



Another Glacial Landscape: Tuolumne Cañon, where thousands of years ago, the great Tuolumne Glacier left its record in the deep trough and polished granite slopes.



Vast Glacial Basin of the Merced, viewed from Glacier Point, on south rim of Yosemite Valley. Below, in Merced Cañon, Vernal and Nevada Falls drop from massive granite steps in the pathway of the ancient Merced Glacier. On the left, Liberty Cap, a glacier-sculptured quarter-dome, rises a thousand feet. The polished granite slopes of Little Yosemite are seen beyond, while the snow-clad cone of Florence Mountain (12,507 ft.) twelve miles away almost hides the still loftier Mt. Lyell (13,090 ft.), several miles farther east. Mt. Clark, the "Obelisk" (11,500 ft.), tops the sky-line on the right.

of their mass and power clearly written on what is certainly the most varied and perhaps the most fascinating mountain landscape in America.

Such a record holds, inevitably, far greater concern for us than the glaciers themselves could have had. The gray granite cañons which the ice-streams dug are often as deep as that in the Arizona sandstones. Though less gorgeously colored, they are quite as wonderful in the carving of cliff and wall. But they have other interest found nowhere else in equal degree. Glorious waterfalls, flung banner-like from the sheer cañon sides,



Washburn Lake (7,610 ft. el.), on the Merced River, above Lake Merced. Long Mountain (11,468 ft.), on the crest of the Sierra, is seen in the central distance.

tell of complex systems of branch glaciers, once dropping their avalanches from lofty hanging valleys. These branches radiated like a family tree from the trunk glaciers. All were bent to denude the Sierra slope of its sedimentary rocks, and dissect the underlying granites with hundreds of cañons, gorges, and valleys. Some thousands of years ago, the glaciers retreated slowly back upon the heights of the range. Each of the larger troughs thus abandoned bore proof of its glacial origin. Instead of the even grades of stream-cut cañons, they presented the form of giant stairways, down which the glaciers had moved majestically, to yield at last to the then tropical heat of the lower valleys. In this descent, the ice carved steps in its path, varying in height and breadth with its own varying mass and the character and jointing of the rock. On these steps, when the shriveled glaciers at last receded, hung a multitude of cataracts, and their

deeply cupped treads held hundreds of high-walled lakes.

The passing centuries have greatly relieved the primitive wildness of this glacial landscape. Forests as important as those of the Rainier Park, and made even more beautiful by their universal commingling of sunshine and shade, have covered the upland moraines and soil beds laid by the ice. Many of the waterfalls on the cañon stairways have cut through the ledges, and become even more picturesque as cascades. While scores upon scores of the fine glacial lakes still remain,—and a larger book than this would be required to show and describe the notable lakes of the Yosemite Park,—many others have been filled up by stream deposit, profitably converting bare water areas into delightful mountain vales. Such is Nature's cleverest art.

Here our debt to the glaciers reaches its climax. For among the filled lake basins made possible by glacier plowing are Yosemite and Hetch Hetchy Valleys, the chief glories of the entire Park. By the height and grandeur of their walls, the unequaled majesty of their cataracts, the charm of their level floors, and the variety and interest of their forests and mountain wild flowers, these famous valleys claim place among the pre-



Mt. Clark (11,500 ft.), sometimes called the "Obelisk" because of its Matterhorn-like wall rising at the head of the glacial cirque seen here.



Buttercups Following Retreat of the Snow. This is the custom of many early flowers near timber line.

eminent treasures, not only of California, but of all America. Their splendor is part of our great national heritage,—part, indeed, of "those higher things among our possessions," as Prof. Lyman has said, "that cannot be measured in money, but have an untold bearing upon the finer sensibilities of a nation."



White Firs (*Abies concolor*), on the Eagle Peak Trail. This tree, so named because of its light gray bark, is common throughout the Park at 5,000 to 7,000 feet, slowly giving place to the Red Fir, which abounds at altitudes up to 9,000 feet.

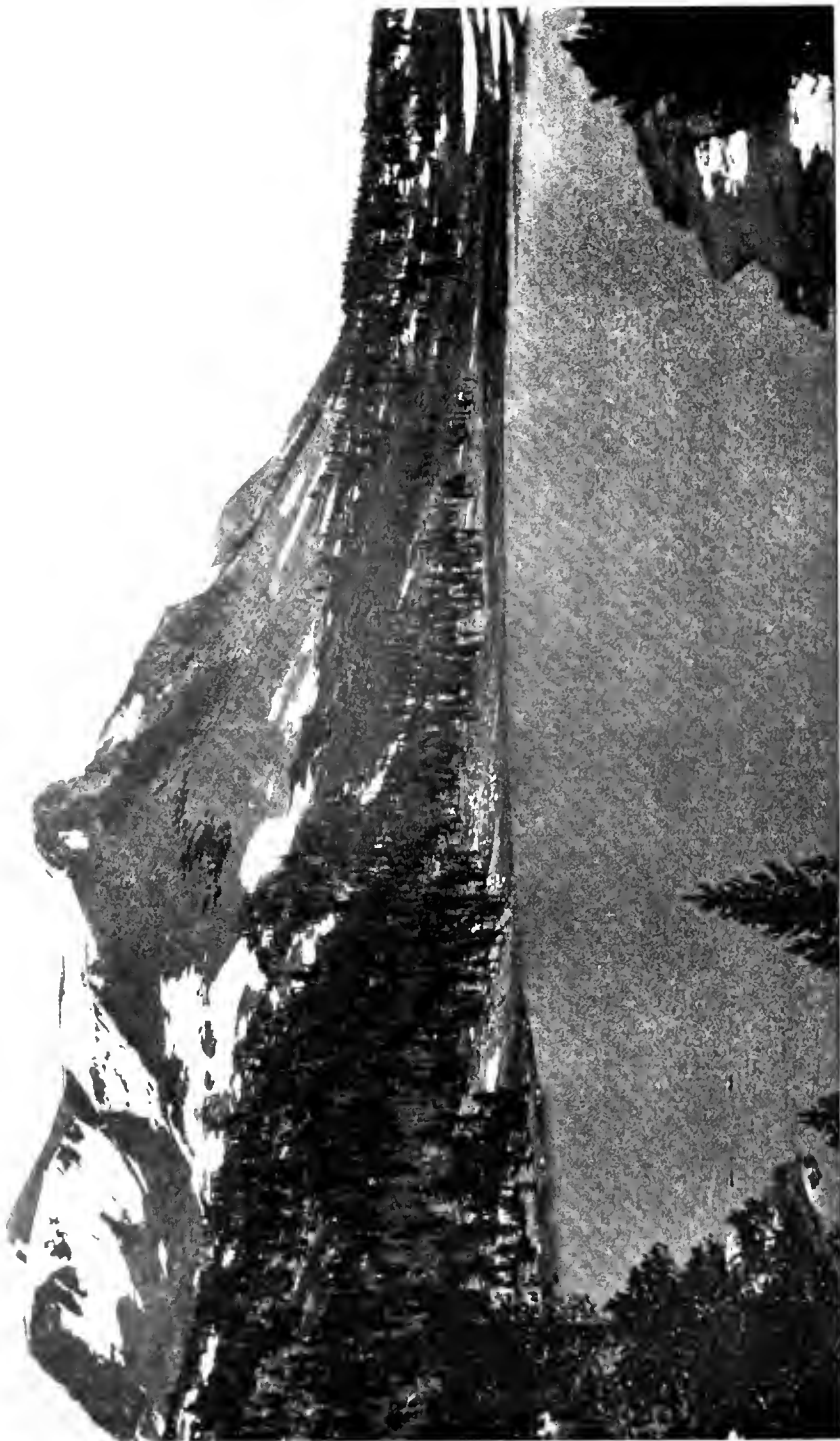
Let no one, however, who knows only these renowned valleys imagine that he has won his due share of Yosemite's inspiration. His birthright of beauty and grandeur here is something even more worth while. The two great valleys are of course magnificent beyond words, and each day spent in them, or given to climbing their walls, will bring new rewards. But I am sorry for those who go no farther; who cannot spend a few days, at least, back in the upper country of the Merced or Tuolumne, among the lakes and shining granite domes of the highlands.

Even though they may climb no snow-peaks, the high mountains will welcome them to sit at their feet, share their gentler sunshine and broader outlook, breathe their diviner airs, learn the joy of the upland trails, and know that the best of Yosemite lies far from the crowds of Yosemite Valley.

For the Yosemite country is a picture of contrasts and harmonies that make a perfect whole. It is not to be known by its famous valleys only. These are but the enchanting foreground of our scene, and gain vastly by the dignity and austerity of their high mountain setting. Viewed separately, the valleys, splendid as they are, do not make the picture, any more than Millet's two figures bent in prayer make the "Angelus." We need to know the background in order to get the true values of the forescene. And only so,



Snow-Creek Falls, on Tennyson Lake Trail.



Dana Mountain (13,050 ft.), seen from Tioga Lake, on its northwest slope.

indeed, can the highly sensational features of the valleys themselves, and their ancient story, be understood. Yosemite Valley and its sister cañon of Hetch Hetchy, with their lesser replicas in different parts of the Park, are all inseparable, geologically, from the High Sierra back of them. The "dropped-block" theory of their origin has long been abandoned. They are linked by the vanished glaciers with the snow-peaks.

Thus our Yosemite picture, both scenically and historically, looks back, of necessity, from the warmth of its lowland grandeur to the wild sublimity of bleak highlands, till recently the home of perennial frost. Even here are startling surprises for one who expects no beauty on the ice-swept heights. The stern sculpturing of pin-naled granite crags that dot the wide plateaus is no more characteristic of the landscape than is their flora. Outposts of the forests, huddled



Two North-side Lakes. Upper Twin Lake, above, is at the head of Eleanor Creek, and forms part of the Lake Eleanor system. Below is Tilden Lake, with Tower Peak (11,701 ft.) in the central distance, and Saurian Crest on the left.

clumps of lodgepole and white-bark pine, are everywhere bravely scal-

ing the ridges. Throngs of hardy mountain flowers, most brilliant of Nature's children, crowd all the ravines and lakesides, and seize upon every sheltered nook. The shallowest pretense of soil, weathered from the somber granites, is sufficient invitation. The short alpine summer is long enough for their modest needs. Boldly they rush the season, edging away the tardy snow-banks, and calling on Old Winter to be up and going. Hardly waiting for his departure, at once they set about their business of hiding the glacial scars with masses of gay color. This ministry of beauty begins at the very snow-line, and grows as flowers and forest march together down to the sunny glacial meadows, and on to the still older valleys of the Sierran middle zone, deep with soil, and glowing in the long summer.

Eager as Nature has been to plant the broad Yosemite uplands with



Cathedral Peak (10,923 ft.), and its neighbors, viewed from summit of the Unicorn in July. Mt. Hoffman (10,921) is on the central sky-line, with Tuolumne Peak (10,875) on right, and Tenaya Peak (10,700) nearer at hand on left. These uniform elevations suggest the general level of the plateau, before its sea-beach strata of sedimentary rocks were planed off by the Tenaya wing of the broad Tuolumne Glacier, sweeping down the canon yonder to join in digging Yosemite Valley. The spires capping the architectural profile of the Cathedral, like similar minarets on other massive peaks near by, narrowly overtopped the lee-stream, and thus disclose the glacier's highest reach.



On Coulterville Road, in the Merced Grove of Big Trees. This grove has thirty fine Sequoias.

flowers and trees, she has scattered other wonders here with even greater extravagance. Almost everything is on a scale of surprise. Nowhere else in America are highland lakes so plentiful or their settings more superb. The vast cataracts of Yosemite Valley dwarf a hundred other great waterfalls and cascades in the Park. These are hardly noticed here, but any one of them, could it be carried over to Switzerland, would become a center of crowded tourist inns. The Park's genial forests of white and red firs, incense cedars, sugar,

yellow and lodgepole pines, spreading up to altitudes of eight and nine thousand feet, with graceful mountain hemlocks and indomitable white-bark pines ranging the alpine levels beyond, thrill every lover of splendid trees. But these are overshadowed by its groves of Giant Sequoias, the marvel of the botanical world,—immemorial trees that might have heard blind Homer sing the fall of Troy, or furnished the timbers for Solomon's temple.

Colossal this landscape is, but its features are so well proportioned that in their immensity we feel no exaggeration or distortion. Only when the visitor compares them with more familiar objects does he clearly see that here, truly, is a playground fashioned for giants. The very harmony of its elements makes us slow to grasp the magnitude of the whole. To know Yosemite well is the study of a lifetime,—labor well repaying the student, as John Muir has found it. We may not quickly learn all its magic, though even the newcomer yields to its spell. He comes again and again who would fully know its mysteries. If Yosemite were of Greece, how inevitably legend, seeking the clue to such perfection of beauty, or



Western end of Yosemite, with Sentinel Rock and El Capitan, seen from Union Point, 2,350 feet above the Valley floor.

endeavoring to account for such majesty, must have peopled it with gods!

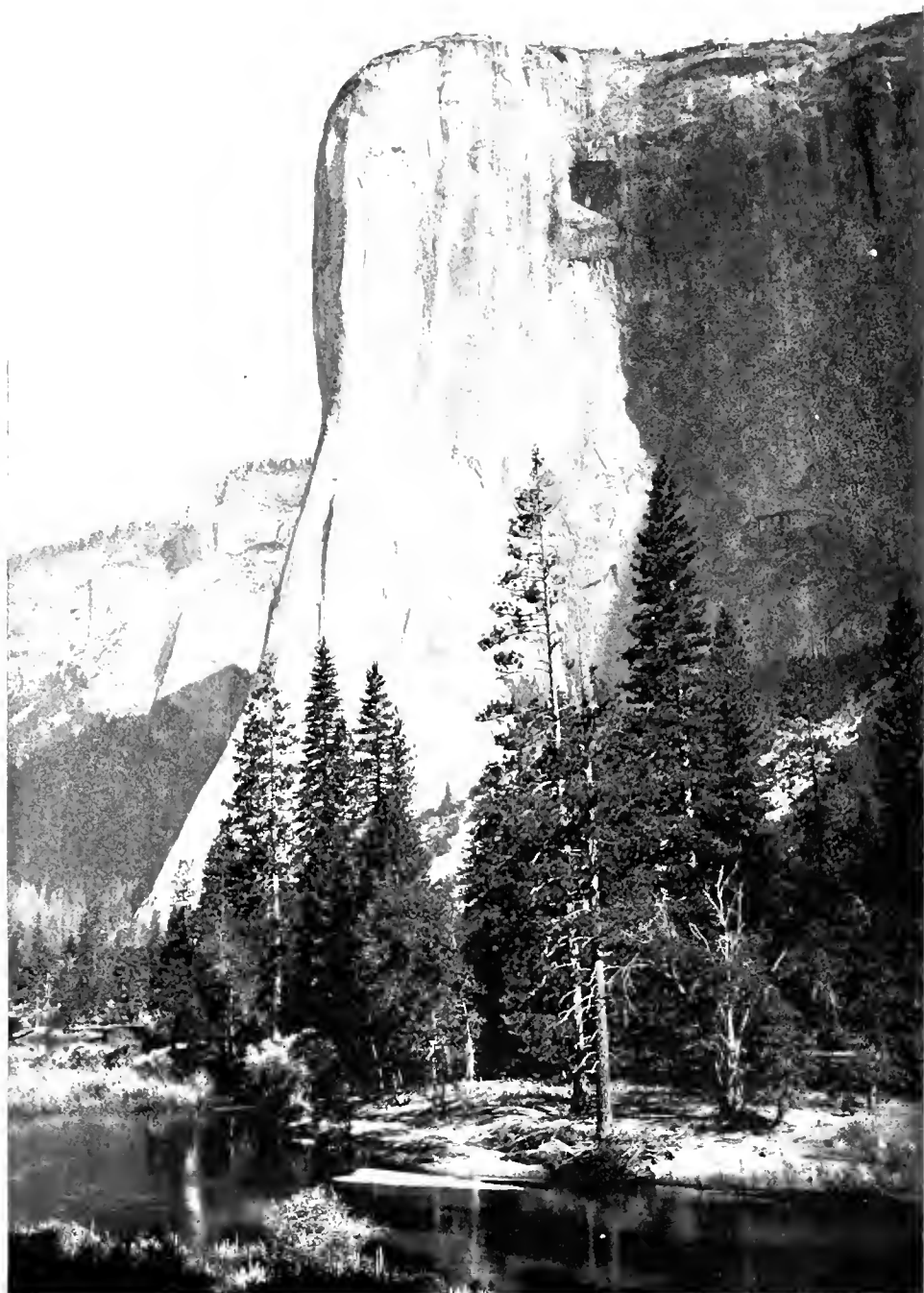
The Indians of the Sierra, however, were seldom builders of myths. Stolid and unimaginative beyond most of their brethren, they saw in their mountains only homes, sustenance, and a tradition of defense. Superstitions and devil-lore they had in plenty. One of their tales, for example, concerned Yosemite Valley, their "Ah-wah-nee," meaning a deep grassy vale. Ah-wah-nee, they told the first whites, was the abode of demons, at whose head was the great Tu-tock-ah-nu-lah, the "Rock Chief," which we



Eastern End of Yosemite Valley, seen from Yosemite Falls Trail, near foot of Upper Yosemite Falls. Beginning with Glacier Point on the right, the sky-line shows successively Mt. Starr King, the Mt. Clark group, Half Dome, and North Dome.

have translated into current usage in the Spanish "El Capitan." His ominous face could be seen in the side of a vast cliff, threatening invaders of his domain. But one suspects that this naïve legend may have been invented for a timely purpose.

The Indian tradition of Yosemite is too much attenuated by the years, and adulterated by the fancies of white writers, to permit the acceptance of many so-called Indian legends of present-day publication. But even these ascribe to the aborigines here no such veneration for the great peaks, the vast, inspiring waterfalls, and other superlative forms of Nature, as elsewhere among primitive men clothed them with power over human lives, or called the native to worship. Nor does it appear that their speculation undertook seriously to explain these phenomena by a mythology such even as grew up in the Northwest, where the legends of the "Bridge of the



El Capitan (the Captain), with early morning sunlight on its east face. One needs the aid of figures to appreciate the magnitude of this block of unjointed granite. The brow of El Capitan is 3,100 feet above the Merced River; its actual summit is 500 feet higher. Each of its two faces exceeds 160 acres in area. A lone tree growing on a ledge under the arch seen in the shadow on the right is more than eighty feet high.

Gods" and the "Battle of the Winds" on the Columbia River, the Puget Sound folk-tale of the "Miser of Takhoma," and the like, show the Indian's restless mind allying Nature with his daily life, and seeking curiously to unravel her problems. For the Yosemite Indian, the unknown darkness held only ghosts and witches. His unawakened, easily-satisfied soul knew little reverence either for the Great Spirit or for Nature. His gods were animals. Higher than the animals his thought seldom rose. His mountains offered him no vision. The loud eloquence of their cata-racts stirred him only to fear. The wise voices of their king-ly and age-old trees gave him no counsel. Yet these mountains supplied him with a place to live in, in comfort and aborigi-



Benches of Massive Granite in the Upper Merced Cañon, polished by the glaciers, and now slowly flaking off under the blows of frost and sun.

nal luxury. They provided him with acorns, nuts, game, and other food. They enabled him to hide

in pathless cañons, where pursuit, he deemed, was impossible, and from the walls of which he might roll down rocks upon any who should attempt to penetrate his mountain fastness.

It is not surprising, therefore, that our first native tradition of the Yosemite represents the Red Man as telling white trespassers that Tutock-ahnula, the great cliff towering yonder above them, would surely punish their intrusion into his Ahwahnee. The white tide was rolling steadily across the plains to the Pacific. A wave had swept up the coast from Mexico. All lowland California was inundated. The lure of El Dorado, the golden god, was filling the lower valleys of the Sierra with greedy and ruthless fortune-hunters. The mountain Indians had no wish to be "civilized" as their cousins of the San Joaquin had been. Hence even as early



Vosemite Valley, from old Inspiration Point on Pohono Trail. Here many landmarks of the famous Valley are in plain view. On the right is seen Bridal Veil Fall, framed by Cathedral Rocks, with Sentinel Dome, Flat Dome and Clouds Rest on the far sky-line. On the left, El Capitan and the lower part of Three Brothers are nearest, with the Royal Arches, topped by North Dome, beyond. It was from near this point that white men, in March, 1851, first looked down into the Valley.

as 1833, long before the discovery of gold and the rush of miners to the foothills, Captain Joseph Walker, the first white man to lay eyes upon the Yosemite country, was carefully warned by his Indian guides away from the great valleys, and made to keep his course on the highlands parting the Merced and the Tuolumne, where now a growing stream of travel each season crosses the Park on the Tioga Road. And when the gold-hunters came, a notable figure, if California furnished any notables to the roll

of Indian history, arose on behalf of his diminished tribe to dispute their advance into the beloved cañon. Tenaya, the Yosemite chief, is the most memorable and picturesque native lead-



Above, Mono Pass (el. 10,599 ft.), looking west, with Mammoth Mountain and Inuma Crest on left. Below, Moody Cañon and Walker Lake, with Williams Butte and Mono Lake beyond.



er in the rich annals of the Golden State.

The actual discovery of this Indian stronghold is a matter of some debate.

Whether it was Walker, in '33, or Savage's frontier militia of '51 that first looked down into the vast Yosemite gorge may never be established. Each expedition, however, is part of our story.

History has done scant justice to Joseph Reddeford Walker. He belonged to that small group of intrepid frontiersmen who did much but wrote little, and whose achievements have been ignored through their own neglect of fame and the claims of more ambitious rivals. Walker's failure to publish his discoveries, and the fact that he served under a jealous commander, who was even capable of claiming them for his own, have combined to obscure his work. That he led a party of Bonneville's men in the first exploration westward from "the Great Salt Lake;" that he disproved the then accepted belief that that lake drained into the Pacific; that

he established the existence, extent and character of the Great Basin; that he charted its rivers and lakes ending as they begin in the desert; that he discovered and was the first to cross the Sierra Nevada Range, entering Alta California through the Mono Pass and leaving it the next year, 1834, by the route since known as Walker's Pass;—here, surely, was a real "pathfinder," worth a clear and permanent page in Western history!



Sardine Lake, filling a glacial cirque in Bloody Cañon, below Mono Pass.

Walker concerns us, not only because he was the first white visitor to the Yosemite region, but especially because the claim is now made by his family and others that he "discovered and camped in Yosemite Valley." The evidence available hardly seems to sustain this claim in full.

On the stone over Walker's grave, in Alhambra Cemetery, at Martinez, is this line, said to have been placed there on authority of



Mt. Hoffman, from Snow Flat, on the Tioga Road. This mass of granite ramparts is the crest of the divide between Yosemite Valley and the Tuolumne.

Captain Walker himself: "Camped at Yosemite, November 13, 1833;" and Munro-Fraser's "History of Contra Costa County," published in 1882, six years after Walker's death, contains a sketch of the explorer, quoting his nephew, with whom he spent his last years, and saying: "His were the first white man's eyes that ever looked upon the Yosemite, which he then discovered, although the honor has been accorded to some other person at a period twenty years later."



Tenaya Peak (10,700 ft.), on the right, with Tenaya Lake in the distance at its foot.

Thus it is seen that the present claim goes somewhat beyond the testimony of Walker and his nephew. We may accept "Camped at Yosemite," but are we warranted in assuming that "at" means "in"?



Indian Acorn Cache ("Chuck-nh")—a large wicker basket set on posts, and thatched with pine branches, points down, to keep out squirrels and mice.

On the contrary, Dr. L. H. Bunnell, who was of the Savage party visiting the Valley in 1851, and who named it "Yosemite," says in his well-known and entirely trustworthy account of that expedition, "Discovery of the Yosemite" (4th ed., 1911, pp. 38, 39):

I cheerfully concede the fact * * * that "his were the first white man's eyes that ever looked upon the Yosemite" above the valley, and in that sense he was certainly the original white discoverer.

The topography of the country over which the Mono trail ran, and which was followed by Capt. Walker, did not admit of his seeing the valley proper. The depression indicating the valley, and its magnificent surroundings, could alone have been discovered, and in Capt. Walker's conversations with me at various times he was manly enough to say so. Upon one occasion I told Capt. Walker that Tenie-ya had said that "a small party of white men once crossed the mountains on the north side, but were so guided as not to see the valley proper." With a smile the Captain said: "That was my party, but I was not deceived, for the lay of the land showed there was a valley below; but we had become nearly barefooted, our animals poor, and ourselves on the verge of starvation, so we followed down the ridge to Bull Creek, where, killing a deer, we went into camp."

Again, on p. 78, Dr. Bunnell says Walker told him that "his Ute and Mono guides gave such a dismal account of the cañons of both rivers that he kept his course near to the



Yosemite Grand Cañon, viewed from its north wall, above Muir Gorge, the entrance to which is seen below, on right. Colby Mountain, named in honor of the Secretary of the Sierra Club, rises beyond, a mile in height above the river. Grand Mountain is near the center of the sky-line, with Cathedral Creek Cañon at its foot, and Falls Ridge between Cathedral Creek and the Tuolumne. Yuma Crest is dimly seen in the distance on the left.



Indian Grist-Mill. An important article of Sierra Indian diet was meal made by pounding black-oak acorns in rude mortars in the granite. The meal was bleached with hot water to remove the bitter taste, and baked into hard cake by dropping heated stones into cooking baskets containing the paste. Such acorn bread is still made by the Indians.

divide,"—that is between the Tuolumne and the Merced. With no other chronicle of this first expedition, Bunnell's quotations from Walker and the Yosemite chief enable us to see the weary explorers struggling up the steep defile of Bloody Cañon from the volcanic Mono plain, descending the long western slope, half starved, and floundering through the un-

tracked snow of November on the divide, to reach the warm San Joaquin Valley, and at last the sunshine and comfort of the provincial capital, Monterey. Probably Walker's route was much the same as that of the later Tioga Road. The Indians had kept the secret of their warm Yosemite home.

We must conclude, I think, that while Walker first traversed the Yosemite uplands, and was, in that sense, as Bunnell admits, "the original white discoverer," the honor of first visiting the floor of the Valley and making known the majesty of its walls remained for the "Mariposa Battalion." Of that second expedition we have a vivid and minute narrative. Dr. Bunnell's account of it, and of the Indian war of 1851, of which it was a part, is something of a frontier classic, and, I believe, a wholly conscientious and credible report. Tenaya, rather than any



Tenaya Creek, below Mirror Lake.



Gates of Tenaya Cañon in Winter—North and Half Domes, Royal Arches, and Washington Column. In beauty of detail, the photograph here reproduced is the finest ever made of these commanding cliffs and peaks. Note the overhanging of the arches, the water-etched rock, and the snow-laden trees and chaparral. The vast span of the concentric strata may be inferred from their elevation: the upper arch is 1,500 feet above the Valley. North Dome rises 3,570 feet; Half Dome, 4,975 feet. Clouds Rest, the snowy slope of which is seen beyond, overtops the Valley by almost 6,000 feet.



Yosemite Squaw, with Papoose
and Baby Basket.

white leader, is unmistakably its hero. In the old chief's last stand for the mountain fortress of his people, we see the Indian at his best. The gold-seekers and game-hunters of '49 and '50 were pushing the natives back into the mountains; the Indians were retaliating as usual with robberies, burnings, and occasional murder. To the reservation established by the Indian commissioners on the Fresno, near the site of the present town of Madera, some of the hill tribes had come peaceably. Others were brought in by the militia companies of the new State government. But far in the heart of the Sierra, the half-breed scouts reported, near the head of the Merced River, was a small tribe that refused to leave its deep, rocky Valley. "There," they said, "one Indian is more than ten white men. Hiding places are many, and the Indians will hurl rocks down upon all who pursue them. Other tribes dare not make war on them, for they are lawless, like the grizzly bear, whose name, Yo-Semite, they have adopted, and as strong. We fear to go to this Valley. There are many witches there."

Tenaya was sent to bring in his tribe, but only a part came, mostly the old and the very young. The aged chief, when charged with deception, promised to go on with his people to the soldiers' camp. Major Savage, he said, might go to the Valley with one of his youths as a guide, but he would find no one

Messengers sent to the Yosemitees failed, but at last their chief came, alone. Addressing Major Savage, a veteran frontiersman who commanded the Battalion, the grave old Indian is said to have spoken this brief oration: "My people



Potemionium (*P. eximium*), at
12,000 ft., near Parker Pass.
This during blue perennial
seeks the highest slopes.



Mirror Lake, at mouth of Tenaya Cañon, with reflection of Mt. Watkins, rising more than 4,000 feet above its surface. Perfect reflections such as this are seen only in the early morning interval between the downward currents of the night and the warm winds that draw up the Sierra slope as soon as the sun strikes it.



South Merced Valley, seen from Lookout Point, on the road from Wawona to Yosemite.

there; the younger men from Mono and the Tuolumne who had married into the tribe had gone back to the mountains. "My tribe is small," he declared, "not large, as the white chief has said. The Piutes and Monos are all gone. Young and strong men can find plenty in the mountains; why should they go to see the white chiefs, to be yarded like horses and cattle? I am willing to go, for it is best for my people."

Sending Tenaya and his band on to the camp, upon the South Fork of the Merced, Savage and his men proceeded across the upland through deep snow, and on March 21, 1851, descended to the mysterious Valley. There they found only an aged squaw. It was as Tenaya had said; the young men and their women had disappeared, and after a brief survey the disappointed whites recrossed the wintry hills to their camp.



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Happy Hours! Deer are a familiar sight everywhere in the upland forests and meadows of the Park.

During this first visit of white men to the Valley, Dr. Bunnell proposed naming it Yosemite, after its Indian inhabitants. Thus the beautiful name was adopted, though not without the usual opposition from men who saw in the Indian merely a

savage to be despoiled of his lands. But the Indian name, as I have said, was Ah-wah-nee. Its ancient tribe had been almost exterminated by disease many years before, and the Valley home abandoned, until Tenaya, son of an Ahwahneechee father by a Mono mother, had led back the few survivors of the race, re-enforced by renegade Monos, Piutes from the Tuolumne, and fugitives from the lowland tribes. The mongrel clan of several hundred members proudly adopted a new name given it by others, Yosemite, or Grizzly Bear, for the ill-reputed animal which the Indians most feared and emulated.



Wild Flowers beneath the Royal Arches.

Savage never got his captives to the Fresno reservation. When nearly there, alarmed by runners from the hostile Chowchillas on the South Fork, and taking advantage of the relaxed vigilance of their guards, they fled in the night, and were not again to be tempted away from their Valley. Inducements successful with other tribes were rejected with contempt. Gaudy clothing and cheap presents Tenaya declared no recompense for loss of freedom in their mountain home. Even the offered beef was refused; the Indians preferred horse-flesh. Hence, after the Chowchillas had been subdued, and the other tribes had made treaties, Savage sent a second expedition, under Captain Boling, to bring in the stubborn Yosemite. Bunnell again was of the party, which expected to have little difficulty in persuading

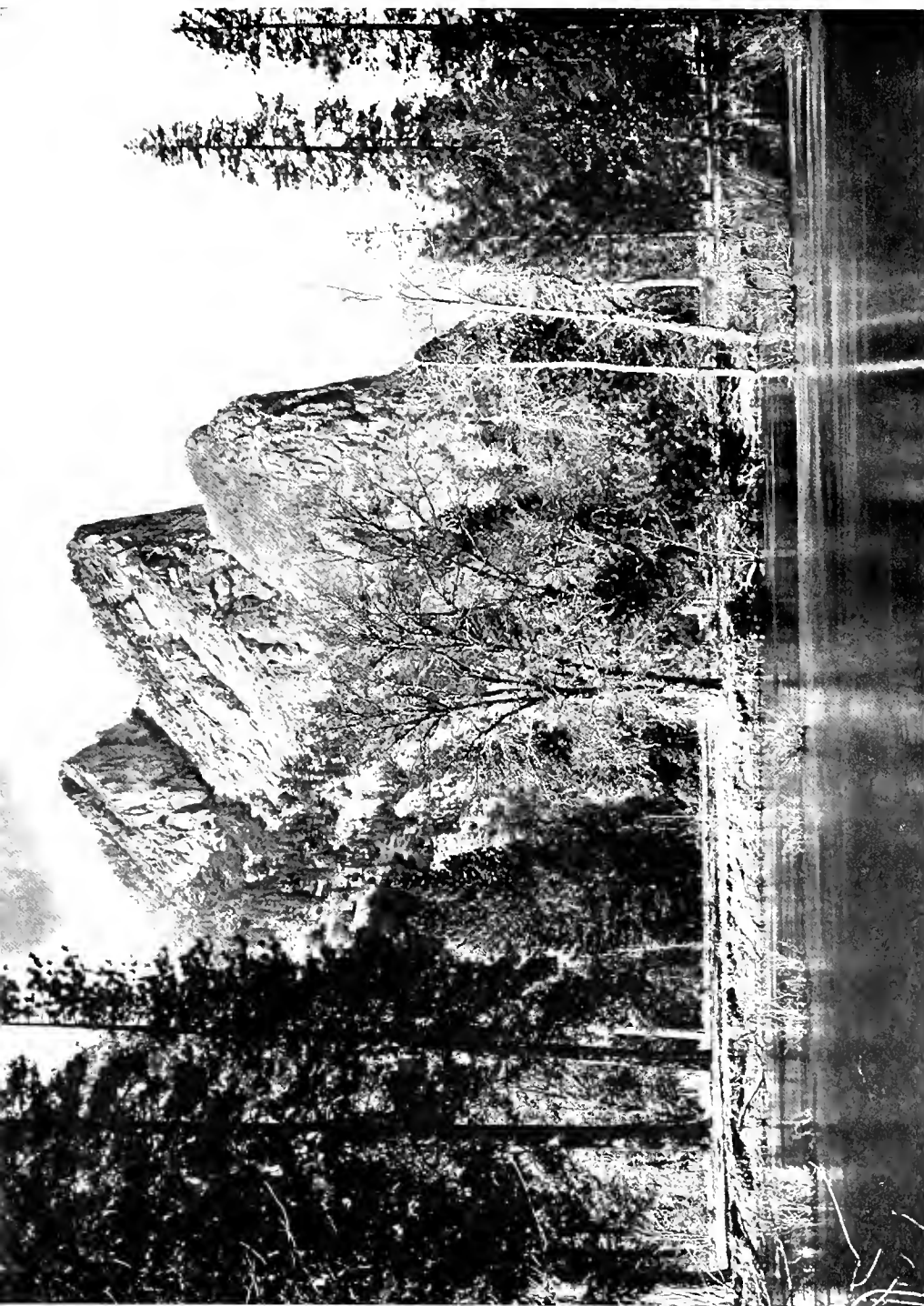
Tenaya to surrender. But on reaching the valley in May, Boling found only deserted wigwams and smoking ash-heaps, telling of a hasty flight. Three of the chief's sons were captured at the foot of the great rock then

named, in memory of the capture, "Three Brothers." One of these youths was killed in trying to escape, and shortly afterwards Tenaya himself was caught by Boling's Indian



In Tenaya Cañon. The upper view looks back to the Half Dome; the lower one shows the gorge blocked by a huge boulder. The steep south wall, swept by avalanches every spring from the side of Clouds Rest, is seen in each picture. This cañon offers great difficulties to the climber.

scouts on a high bench east of the "Big Falls," whence he had been watching his enemies below. When he saw the body of his son, his grief found vent only in a look of hatred that Boling well understood. No word could be coaxed from him in reply to the Captain's regrets for the youth's death. A day or two later, he made an unsuccessful attempt to escape across the swollen Merced River. Then at last his grief and rage found utterance



Three Brothers, an imposing mass of granite which the inclined joint-planes enabled the glaciers to carve into triple gables. The name was given in 1871 to commemorate the capture here of the three sons of the Yosemite chief Ten-yah, The Indian name, however, was "kum-pu-pu-zen," or "Frost's Heads." Eagle Peak, the highest of these cliffs, rises 3,800 feet above the Merced, which is seen in the foreground.



Yosemite Indian Basket-Maker, weaving a burden basket. The large basket to the left is for cooking.

Tenaya's appeal to the unknown was as futile as eloquence generally is. The white conquest paid no heed to his threats. Steadily rounding up the savages, Boling's party captured the last of their band at a rancheria or village a few miles above the valley, on a beautiful lake walled by polished granite cliffs and domes, which they at once named Lake Tenaya. "But it already has a name," Tenaya protested,—“'Py-we-ack,' Lake of the Shining Rocks.” The naming of a lake in his honor seemed to him a poor equivalent for the loss of his territory. Another chance was given him. Taken at last to the Fresno, he soon begged for leave to quit the heat and dust of the reservation; and on his pledge of their good behavior, he led back his people once more to the cool spaces of the Yosemite. The aged sachem himself kept faith, but he could not control his young men. The killing of prospectors in the

in pathetic words.

“Kill me, Captain,” he cried, “as you killed my son; as you would kill my people, if they were to come to you. You have made my life dark. But wait a little. When I am dead, my spirit will make trouble for you and your people. I will follow in your footsteps, and be among the rocks and waterfalls, and in the rivers and winds. You will not see me, but you shall fear the spirit of the old chief, and grow cold.”



“Umbrella Tree,” a snow-flattened pine at head of Nevada Fall.



Tenaya Lake, at the head of Tenaya Creek Cañon. Named for Chief Tenaya, whose last stand for his Yosemite home ended in his capture at this lake. Its Indian name was "Py-we-neck," or Lake of the Shining Rocks. The remarkable domes and polished granite slopes surrounding this beautiful lake vividly recall its comparatively recent glacial history. The Tioga Road skirts its north shore, en route to Tuolumne Meadows.



North Dome, seen from Happy Isles.

Valley the next summer quickly brought a third visit from the soldiers, and the final dispersion of the Yosemite. It hardly detracts from the pathos of Tenaya's losing fight for his wild home that he and his last handful of followers were killed by Monos whose hospitality they had repaid by basely stealing their horses. The Indian

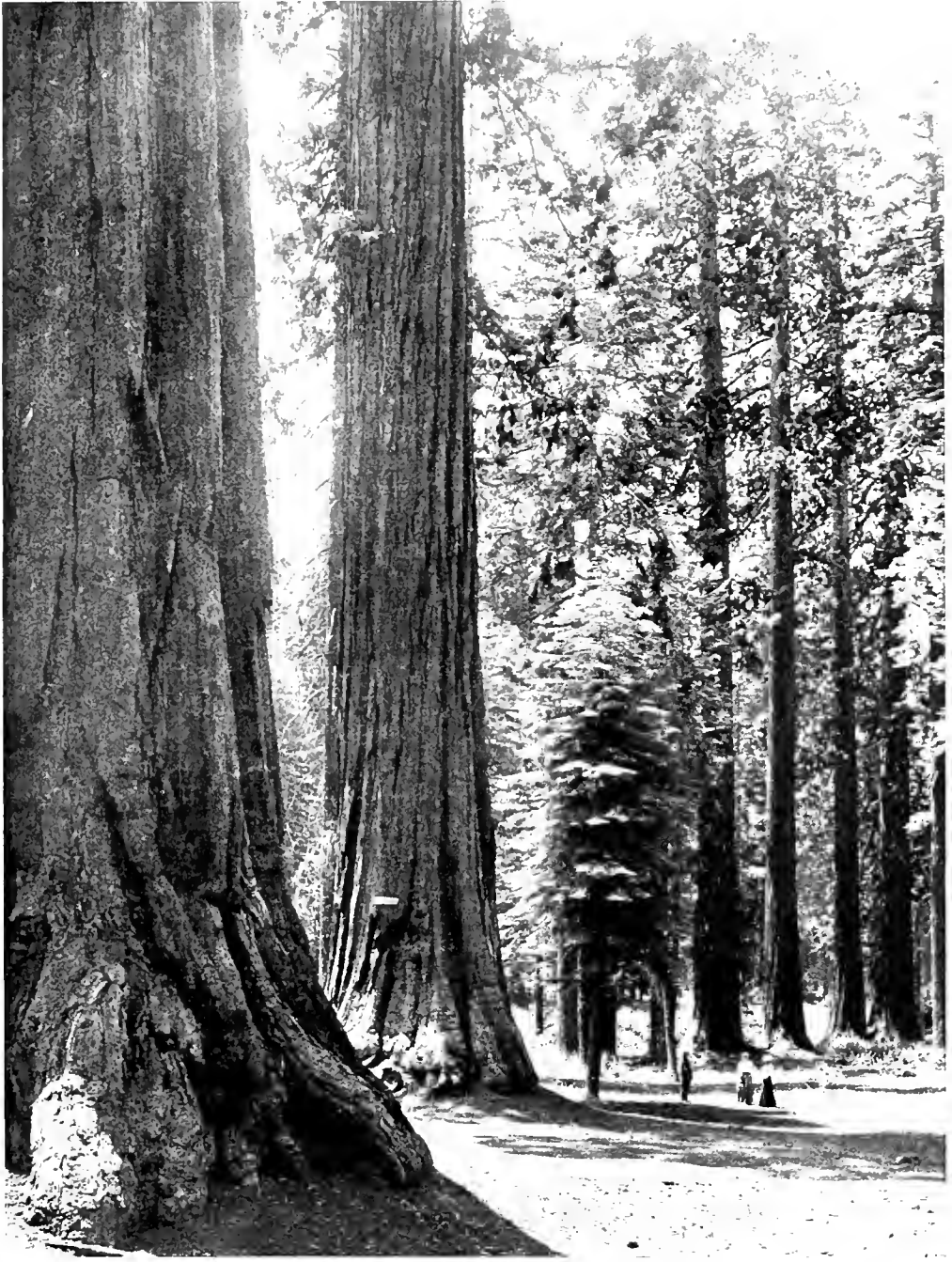
code did not recognize other people's property rights in live stock.

Present-day visitors to Yosemite are often disappointed that their first impression of the height of the Valley walls falls short of published accounts. Yosemite magnitudes are not quickly realized. Even Dr. Bunnell was ridiculed by Captain Boling and others when he estimated the superb granite cliff opposite their camp as at least fifteen hundred feet high. Some guessed five hundred, others eight hundred. Not even Bunnell himself dreamed that El Capitan actually towered more than three-fifths of a mile above the silent Merced.

Its Indian inhabitants gone, Yosemite soon came into public notice. As early as 1855, the first tourist parties visited the Valley. Trails were quickly opened, rude inns established, and, in 1864, John Conness, a Senator from California, introduced and Congress passed an act granting to the State "the 'cleft' or 'gorge' in the granite peak of the Sierra Nevada Mountains . . . known as the Yosemite Valley, with its branches or spurs, and in average width one mile back from the main edge of the precipice, on each side of the Valley, with the stipulation, nevertheless, . . . that the premises shall be held for public use, resort, and recreation." To this grant was added the "Mariposa Big Tree Grove," not to exceed the area of four sections." In 1890, Congress created the Yosemite National Park, subject to the grant of 1864. Its lines have since been modified considerably by Acts of 1905 and 1906, excluding the head basins of the north and middle forks of the San Joaquin, and em-



Blue Jay, in Merced Cañon below Vernal Fall.



The "General Grant" and "General Sherman", with the "Four Guardsmen", in the Mariposa Grove. Readers should not confuse the two trees here which popular custom has named for the famous American soldiers with the older and larger trees thus called in the General Grant and Sequoia (Roosevelt) National Parks, farther south. These trees, however, are of considerable size, the "Grant" having a diameter of twenty-one and the "Sherman" of twenty feet. The "Guards" are younger trees of great beauty, averaging perhaps fifteen feet in diameter, and notable for their typlend arrow-head crowns, not yet broken by storm or lightning. The graceful small tree in the center is a young Sequoia.



John Muir in Hetch Hetchy. The tree shown here is a fine example of Yellow Pine.

bracing more completely the watersheds of the Tuolumne and Merced Rivers. Its area, as already noted, is now 1,124 square miles.

The dual administration established by the creation of the National Park surrounding the State Park was soon found impracticable and disastrous. The State commissioners did the best they could with the ten or fifteen thousand dollars annually voted by the Legislature, but these inadequate appropriations were largely consumed in the salaries of park guardians and the traveling expenses of the commissioners; little was left for needed improvements. Much of Yosemite Valley was fenced in, and let to private contractors. Conflicts occurred between the State

and Federal authorities. A forest fire, for example, was sometimes left to burn while the officers debated as to which jurisdiction was responsible.

John Muir was one of the first and most active in pointing out the importance of ending this *imperium in imperio*. His opportunity came in 1903, when he was invited by President Roosevelt to accompany him on his visit to Yosemite. Governor Pardee, President Benjamin Ide Wheeler of the State University, and other well-known men were of the party, which received Mr. Muir's arguments for the recession of the Valley and Big Tree grove with unanimous approval.

A vigorous State-wide campaign was started by the Sierra Club, the strong California society of mountain-lovers of which Muir was president. The plan won generous support from the newspapers of the State, as well as from the Native



Distinguished Visitors to the Grizzly Giant. On President Roosevelt's right are Gifford Pinchot and Gov. Pardee; on his left, John Muir, Benjamin Ide Wheeler, etc. Out of this visit grew the recession of Yosemite Valley and the Mariposa Grove, and their incorporation in the Yosemite National Park.

Sons and other large organizations; and was eventually successful, though its advocates had to overcome bitter opposition, both at Sacramento and in Washington, from certain politicians and favored concessionnaires whose private interests conflicted with the public advantage.

The recession, which was accomplished in 1905, has been amply justified by its results. Better order prevails, a beginning at least has been made in the building of needed roads, hundreds of miles of trails have been opened, the forests are protected, and in every way the rights and conve-



Forest Fire on South Fork of the Merced, near Wawona. This picture, a forceful sermon against carelessness with fire on mountain trails, looks down from Wawona Point, above the Mariposa Grove of Big Trees. The priceless Sequoias themselves might have been ruined had not this great conflagration been extinguished.

nience of the public are promoted. The Federal management, while sometimes severely criticised, and not always unjustly, has obtained and economically expended Congressional appropriations now annually averaging \$300,000, and this money has paid for improvements that would still be lacking under the clumsy dual system. No one who views the matter impartially can now be found to advocate a return to the old régime. For the far-sighted Park Administration of to-day is developing here, as rapidly as Congress can be persuaded to provide the means, a real people's recreation ground, commensurate with the public need and the opportunity afforded by the Park's scenic resources. Under the system of divided rule such progress would not have been achieved in a century. But much is still to be done.



Typical Forest Trail on the Sunny Yosemite Uplands. Sunrise Trail, leading from Little Yosemite to Tuolumne Meadows.

When I first journeyed up to the Yosemite highlands, twenty-four years ago, the name "Yosemite" signified, even to a majority of Californians, merely the seven-mile cañon known as Yosemite Valley, with its sensational cliffs and cataracts, its forested floor, the curious domes towering upon its rim, and for some visitors the Mariposa Grove of Giant Sequoias, seen en route. To reach even this limited goal cost heavily in time, comfort and money. The number of visitors, naturally, was small, and their stay short. Few penetrated beyond the noted Valley, to

view the yet nobler High Sierra. Clarence King and John Muir, almost alone among men who commanded a public hearing, had done something by exploration and writing to interest their fellow-countrymen in that great sunlit hinterland which stretches up to California's far, snow-capped skyline. But roads into this alpine paradise were wholly lacking, trails were scarce, and only expert mountaineers quit the beaten track.

It was then quite commonly assumed that our National Parks were to be left for the most part in their virginal wildness,—something which the general public would neither need nor care for, and which would be visited chiefly by professed nature-lovers. Only an inspired dreamer like Muir, or an enlightened foreign observer of our national needs like Bryce, could have foreseen that the public itself would soon demand their development for the relief and instruction of the people at large, and especially of the inhabitants of our superheated valleys and towns.

Recognition of this requirement has been slow, and nowhere slower than in Congress, among politicians absorbed in securing for their own



The Domes in a Winter Storm, with snow blowing from the heights overlooking Tenny's Cañon.



A Close Stand of Giant Sequoias. Many Big Trees spread at their base, like the one on the left, which is credited with a diameter of more than twenty-five feet. But this rapidly diminishes above, so that at thirty feet from the ground it is probably less than fifteen feet.

districts the largest, fattest slices from the pork barrel. "Statesmanship" has never been keen for what it contemptuously terms "scenery." It was eleven years after California receded the Valley and Big Tree Grove before the Congressional grants exceeded \$100,000. But beginning in 1916-17, the Park has had approximately \$300,000 a year for upkeep and betterments. This is about one-half the sum, conservatively estimated in view of the increasing rush of visitors, that should be spent annually for

five or six years on well-planned roads alone, if the Park is to be made accessible in proper degree to those who most need its opportunities for rest, inspiration and sport.

It will surprise many who read this to learn that all of the roads entering the Yosemite National Park have



Crossing Cold Cañon Meadows, on trail between Conness Creek and Virginia Cañon. This is a typical filled glacial lake. There are hundreds of such broad, shining upland meadows in the Park, each a park in itself, carpeted with the finest grass and brilliant with alpine flowers.

been built by private enterprise, none by the Government. There are five of these, and three are old toll roads which the Park Administration has taken over and is now maintaining, in spite of grades often as high as twenty per cent., for want of money to re-locate them. The road descending the south wall was made by the owners of Wawona, the well-known mountain inn on the route to the Mariposa Big Trees. The Coulterville and Big Oak Flat Roads were also originally toll roads. With elevations well above six thousand feet, all three of these highways are sometimes closed



In Ten Lake Basin. This region, lying between Mt. Hoffman and the Tuolumne Grand Cañon, offers delightful lake scenery, fine fishing, and beautiful forests. At an altitude of 9,500 feet, the trees seen here are the shapely mountain hemlock, with other habitues of sub-alpine levels. It is reached by trail from the Tioga Road.

by snow till June. The fourth road into the Park leads up the wild Merced Cañon, from the terminus of the Yosemite Valley Railroad at El Portal. It was built in 1907, and although its fourteen miles lie almost wholly within the Park, the Government compelled the railway to build it, in order that it might deliver its passengers by "auto-stages" at Yosemite Village. This fine highway the Park Administration also owns now, and has been forced by the tremendous traffic of heavy vehicles to regrade it. The road will be hard-surfaced as soon as money can be had for that purpose.

These roads were all built to bring people to Yosemite Valley, none to carry them into the uplands above it. Over the three ridge roads, notwithstanding their short season, came most of the 13,400 private automobiles which entered the Park last year. The fourth road, extending as it

does only from Yosemite to El Portal, is as yet merely a continuation of the railway. But the State road now building back into the Sierra from Merced, and already completed as far as the village of Mariposa, will doubtless be finished to El Portal within two years. Laid on easy grades, this will give automobilists a well-made highway, following the level of the Merced River, directly to the floor of the Valley. Open all the year, it will make Yosemite the most thronged of California winter resorts, the Mecca of every tourist, as of multitudes of Californians; while in summer



Mammoth Peak (12,225 ft.), seen from Mono Pass, en route to Bloody Cañon.

it will carry into the Park an unbroken procession of motor vehicles from all parts of the State, led by an army of refugees from the sun-baked San Joaquin and Sacramento Valleys.

Yosemite Valley is thus threatened with a popularity which all lovers of its gentler values may well deprecate,—a patronage they would fain see spread over a wider area. It is in grave danger of speedily becoming the most overcrowded tourist center in America. Only prompt relief through the providing of easy access to the highlands can prevent the destruction of much of its charm. Beginning with the admission of automobiles, in 1915, the congestion of hotels and hotel camps, and even of the public camping grounds, has grown apace. But this park-like vale, with all a park landscape's delicacy of flowers and trees, was not planned by Nature for the bivouac of a city's population. The need of roads to the upland eastward has cried aloud to Congress for years. To-day the lack of them is a scandal. To-morrow, with the completed State road from Merced pouring fifty thousand automobiles into this cul-de-sac in a summer, it will



Tenaya Lake, seen from the Tioga Road, built many years ago across the Sierra by the owners of the once famous Tioga Mine. East of Tioga Pass this road is maintained by California as a State highway, but west of the summit it is now Government property. It crosses the entire Yosemite Park, and gives access to some of its most noted scenery. Twenty-five hundred private automobiles carried 8,000 Yosemite visitors over this road in 1920. At the upper end of the lake is a well-placed lodge.

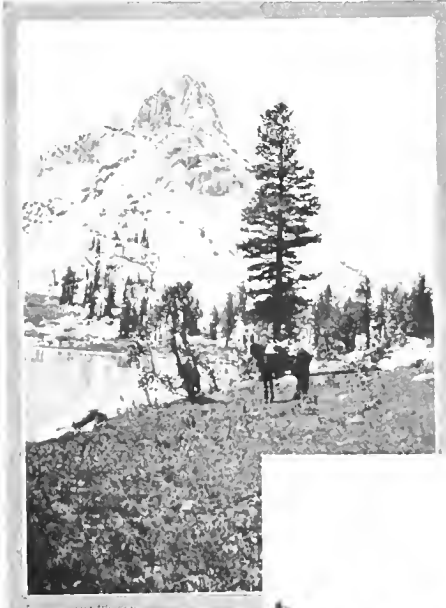


Tuolumne Meadows, with Lambert Dome, on the Tioga Road. The easy slope on the east or up-stream side of this and other domes, with their steeper west faces, indicates the direction in which the glaciers flowed. Fairview Dome, south of the Meadows, was similarly planed off by the great Tuolumne Glacier. Mr. Dana is seen here on the right sky-line.

be a crime,—a crime against the people, for whose recreation and instruction the Park was set apart, and who need the great open spaces of the High Sierra; and equally a crime against the priceless beauty of the Valley floor, where forest and flowers now suffer increasingly from the vandalism of transient campers. But still Congress halts. Those who would escape the crowds and noise of the Valley can gain little of the high country save

by climbing rough mountain trails. That method of travel, though it unquestionably has much to commend it, is impracticable for many who need the uplands most. Only one district east of the Valley is now reached by a highway,—an interesting old mountain road, built for the teams of a mining company, with the happy disregard of all mining roads for grades, and no expectation of ever serving automobile travel.

This is the fifth of the roads into the Park to which I have referred,



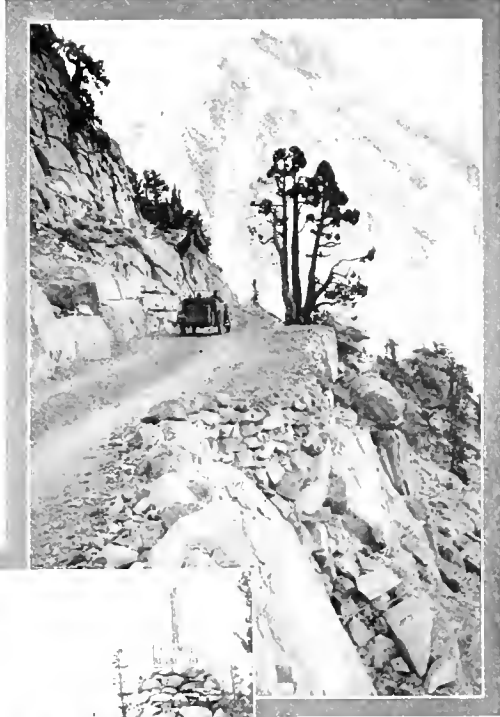
Young Lake, five miles north of Tiolumne Meadows, with two splendid mountain neighbors: above, Ragged Peak (10,858 ft.); below, Mt. Conness (12,556 ft.).



and the only one now leading to the Yosemite High Sierra. It was not constructed as a toll road, but merely to give access to certain mineral prospects east of Tioga Pass. The mining operations failed, and the road fell into disuse, though its owners, to preserve their title, dragged a wagon over it once a year. Bought five or six years ago and given to the Government by the public-spirited Director of the National Parks, Mr. Stephen T. Mather, it has since received such partial repairs as the inadequate Park appropriations made possible, and been used by a tide of motor travel which bears convincing testimony to the need of modern roads from Yosemite Valley to the upper country. If the Congressmen responsible could

but once be driven in automobiles over this antiquated road, on its tedious way to the High Sierra, there might be a prompt ending of the neglect which has so long left the Valley lacking proper connection with its hinterland.

For the Tioga Road never approaches the Valley, and affords but a difficult and makeshift outlet to the increasing crowds there. Our maps show it crossing the entire central zone of the Park. But it holds throughout to the highland parting the Merced and Tuolumne Rivers. Passing Mt. Hoffman at Snow Flat, north of Yosemite, it drops to Tenaya Lake, thence following the cañon seen on page 16 to Tuolumne Meadows, the chief camping and mountaineering base on the upper Tuolumne. Climbing then to the Park's east boundary at Tioga



Leaving Yosemite National Park via Tioga Pass and the Leevining Cañon Road. The lower view looks back through the Park gates, at the summit of the Pass (9,941 ft.), to Mts. Dana and Gibbs and Kuna Crest. Above is seen the State road, hung on the cañon wall.

Pass, it joins the notable highway which California has built down Leevining Creek Cañon to Mono Lake and north to Lake Tahoe. At Tenaya Lake the road has, by Snow Creek Trail, its closest practicable contact with Yosemite. But while Tenaya, with its convenient lodge and its loud call to campers, is only eight miles by air-line and fourteen by trail northeast of Yosemite Village, automobiles bound for it must leave the Valley on the Big Oak Flat Road, climbing westward up the great north wall, then travel outside the Park to a junction with the Tioga Road, and there turn

east to the lake,—a journey of sixty-one miles over roads never meant for a gasoline car. Yet such is the pressure for the High Sierra and the fascination of the Yosemite-Tahoe trip that several thousand private automobiles travel this route from the Valley each summer.

The new road most needed in the Park, therefore, is by common consent a well-graded modern highway which will avoid this long detour, and connect directly with the Tioga Road at Tenaya Lake. Such a road, by enabling automobilists quickly to reach Tuolumne Meadows, will double



Sunset on Mono Lake. View from Paoha Island, with the Sierra Nevada in the distance. Mt. Dana (13,050 ft.) accents the sky-line on left.

the possibilities of pleasure in every visit to Yosemite. This requirement forms the most important item in the road-building plans formulated by Superintendent W. B. Lewis, for which every lover of the Yosemite Sierra will wish the Park Administration success in its effort to get a prompt and adequate Congressional appropriation. The route proposed necessarily offers many engineering problems; nevertheless the sum required is moderate. And it is agreed that this is the most feasible and least costly route on which a road can be carried quickly from the Valley floor to the upper country. The road will leave the Valley at Happy Isles, following up the Merced Cañon past Vernal and Nevada Falls, skirt the foot of Clouds Rest, cross boulder-strewn Forsyth Pass, at an elevation of about 9,000 feet, and zigzag swiftly down to Tenaya Lake. Its total of approximately twenty miles will cut forty-one miles from the present roundabout journey to that lake via Crane Flat, and so will absorb practically all travel from

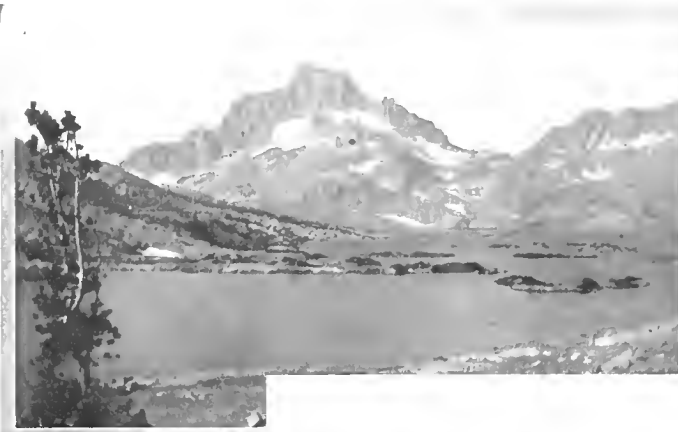


Nightfall in Lee's Ferry Canyon, several miles below Tioga Pass. The opening of Tioga Road across the Yosemite Park for motor travel enables thousands of automobilists each summer to make the Journey down the remarkable State highway seen here, to Mono Lake and on to Lake Tahoe.

Yosemite to the Tuolumne and Tioga Pass. Such a road, besides greatly shortening the trip to Soda Springs, and drawing thousands to the delightful country north and east of Tenaya Lake, will also stimulate travel to the upper Merced, by carrying visitors to the top of Nevada Falls for the start on their foot or horseback journey to Lake Merced, Lake Washburn, and the headwater peaks.

The most effective step yet taken to make the National Parks of practical use to the people was the admission of private automobiles. The

result, in the Yosemite Park, is indicated by the two totals, 15,145 and 68,906, one representing the visitors in 1914, the other those of 1920. Regarding the second total, the most signifi-



Thousand Island Lake one of the most interesting alpine lakes in the Yosemite region. The lower picture, from the foot of Banner Peak looking northward, might be mistaken for one of the Scotch Highland lochs; but the reverse view has an unmistakable note of the High Sierra scenery in its most characteristic and inspiring form.



cant facts are that 46,074 of these people entered the Park in their own cars, 13,418 in number; and that more than 25,000 of them camped in the public camping grounds on the floor of the Valley. These figures prove that the people of California, in their need of escape from the hot lowlands, are themselves making the opening of the Yosemite High Sierra imperative. Unless this is promptly and intelligently pushed, the congestion in the Valley will shortly render conditions there fatal in large measure to its beauty, and intolerable to the public.

Congressional appropriations have built more than three hundred miles of good roads in Yellowstone National Park, and similar justice to the needs of Yosemite Park will give Superintendent Lewis the compara-



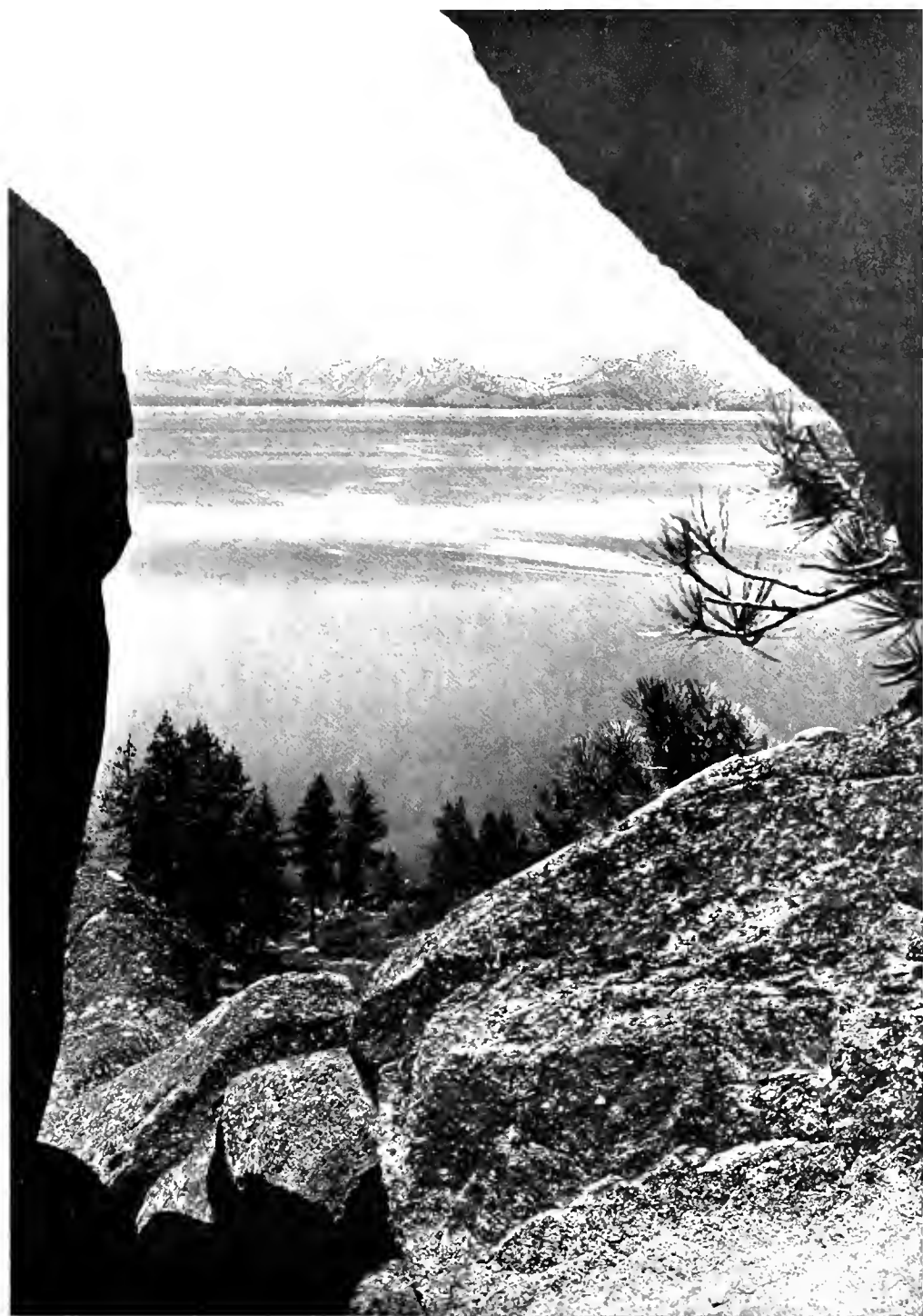
Banner Peak (12,357 ft.), Mt. Ritter (13,156 ft.), and the Minarets (12,000 ft.), seen from Shadow Lake, east of the range. This noteworthy group, formerly a part of Yosemite National Park, but later eliminated to promote mining operations, which failed, rises five miles east of the present Park limits. Almost wholly scenic in its resources, Director Mather asks that the district be restored to the Park, so that extensions now planned for the trail system may promptly make it accessible.



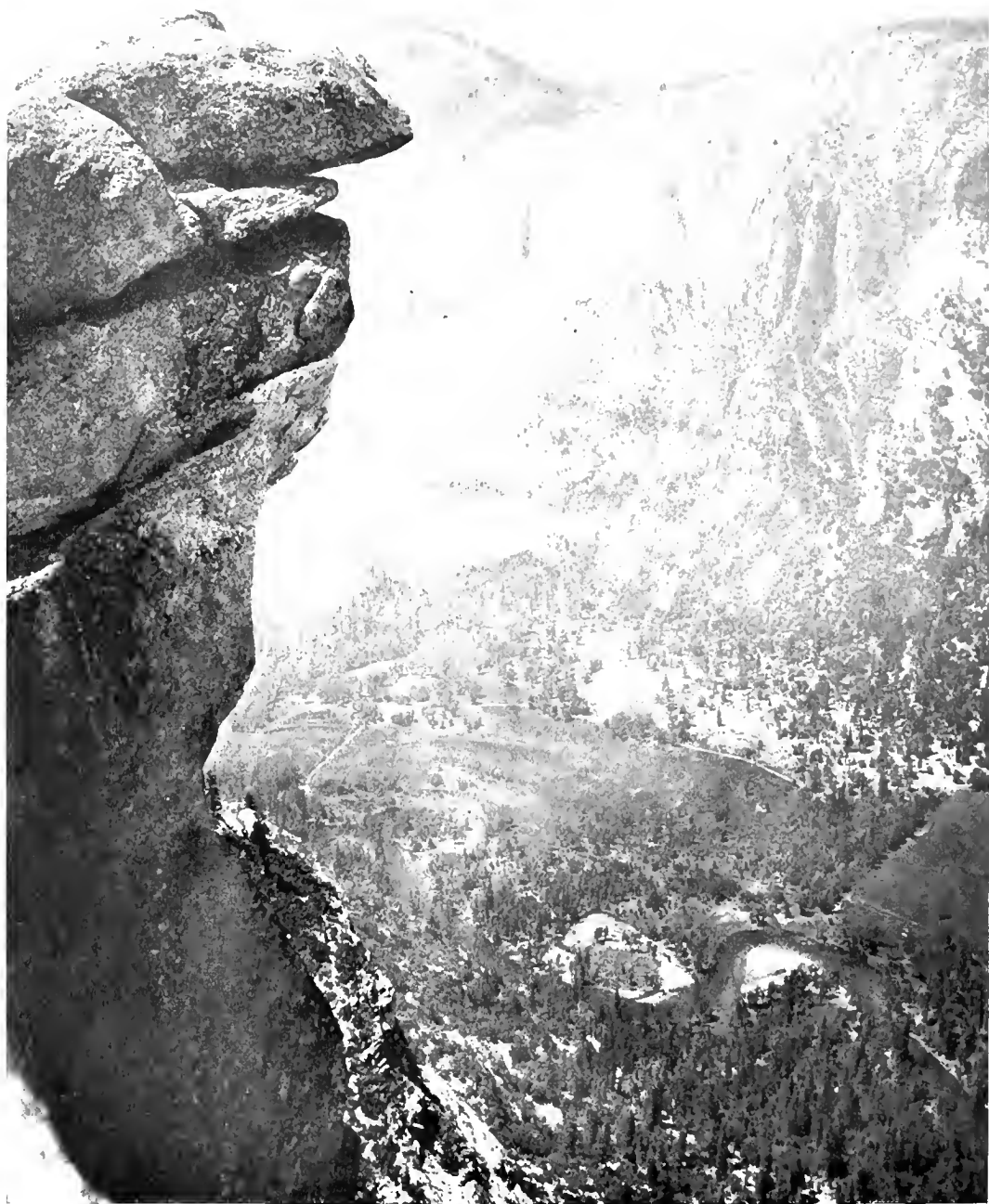
The Devils Postpile, a striking outcrop of columnar basalt, on the headwaters of the Middle Fork of San Joaquin River, fifteen miles east of Yosemite National Park. Lava, in cooling, often breaks in such pillars, commonly hexagonal in cross-section, and sometimes, as here, of considerable height. The most famous of such phenomena is the Giants Causeway, on the north coast of Ireland. The Devils Postpile is in the region, once within the Yosemite Park boundaries, which Congress is asked to restore to the Park.

tively modest sum of \$3,290,000 which he is now asking Congress to appropriate for road construction and reconstruction, to cover a period of five years. Congressional grants to this Park have hitherto been devoted for the most part to "maintenance," and merely served to keep up the old roads taken over by the Government. Of such roads there are 138 miles within the Park limits, and for the betterment of these, including the much-needed paving of the roads on the floor of Yosemite Valley and to El Portal, Mr. Lewis asks \$1,280,000 of his itemized total. The newly located road across Forsyth Pass will call for \$1,500,000. This might seem a scant estimate to those acquainted with the cost of other moun-

tain roads, but knowing the work already accomplished with small sums by this efficient engineer, we may be confident Mr. Lewis will give the Park an adequate highway on the amount named. But he first must get the money; and Congress is most unlikely to vote it until California's Senators and Representatives at Washington can forget politics long enough to insist on the proper development of the greatest national asset within their State for the health and pleasure of the American people.



Lake Tahoe. This famous lake, rimmed by the snowy ranges of the northern Sierra, lies a hundred miles north of the Yosemite National Park, from which it is reached both by rail and automobile roads. It has an elevation of 6,225 feet, and an area of 204 square miles. The re-opening of the Tioga Road connects Tahoe and Yosemite more directly than ever before, making the Yosemite-Tahoe trip one of the finest possibilities of a visit to either of these great scenic resorts.



Overhanging Rock at Glacier Point, the most famous and important viewpoint on the rim of Yosemite Valley. From it the spectator looks down 3,337 feet to the Merced, winding among forests and meadows, and across to the beautiful Yosemite Fall, dropping nearly half a mile out of its own hanging valley.



Merced River and the Forest in Yosemite. Half Dome is seen in the distance (center), with the Royal Arches on the left and the vast projecting prow of Glacier Point on the right.

II.

THE CAÑON OF YOSEMITE.

The cataracts blow their trumpets from the steep;
No more shall grief of mine the season wrong;
I hear the echoes through the mountains throng,
The winds come to me from the fields of sleep.

—*William Wordsworth.*

"Of the grandest sights I have enjoyed,—Rome from the dome of St. Peter's, the Alps from Lake Como, Mont Blanc and its glaciers from Chamouni, Niagara, and Yosemite,—I judge the last named the most unique and stupendous."—*Horace Greeley.*

"The only spot I have ever found that came up to the brag."

—*Ralph Waldo Emerson*

EARLY visitors to Yosemite paid well for its pleasures. To reach the Valley by any of the old routes, before the day of automobiles, or even of railway trains to the border of the Park, meant a hot and dusty ride of two or three days, in a primitive vehicle, over the roughest of mountain roads. In common with thousands of others, I painfully recall my first trip. We quit the train from San Francisco at Raymond, to endure a day of misery in a crowded "stage," which jolted us up from the low country into the noble valley of the South Fork at Wawona. That hot and dusty ride made the friendly little inn there, when we finally reached it, seem as luxurious as a metropolitan hotel. The next day was spent among the Mariposa Big Trees. The third carried us across the broad Wawona ridge to Inspiration Point and the hard-won vision of Yosemite itself. We were bruised and happy.

Many visitors still come and go by the Wawona route, motoring in their own cars from all parts of California, or leaving or returning to



Chiuwatna Falls, near Wawona; one of the most beautiful series of cataracts and cascades in the Park.

the railway at Merced by the comfortable "auto-stages." Automobiles, good roads, and improved hotel service have robbed the trip of its terrors. The traveler is able to enjoy fully the increasing interest of a wonderful ride, as his motor climbs swiftly back among the great, forested hills of Wawona. It is a country which, even without Yosemite or the Mariposa Grove, might well draw him to its own splendid outlooks, deep valleys, and fine waterfalls and lakes,—a sportsman's paradise that should have its place in any extended Yosemite outing.

The Wawona route, like the Big Oak Flat road north of the Merced, is recommended by the fact that it gives the incoming visitor his introduction to Yosemite Valley from the heights. Few things in this world can exceed the surprise and pleasure of that view.

Nearing the rim of the plateau, the road suddenly leaves the forest for a turn far out on a rocky promontory. More than a thousand feet below, the river lies, a white thread, at the bottom of its gorge. The foreground is wild and unformed,—an abyss fringed by projecting crags and pinnacles, and barren save for a few rugged and adventurous pines clutching the ledges. But eastward opens the famous Valley, always, when seen from the heights, more impressive than imagination has conceived it. Its nearest cliffs tower almost as far above as the river lies below, while, miles beyond, the great picture closes with domes and peaks lightly silhouetted against the softest blues and whites of the cloud-flecked Sierran sky.



"New England Bridge," at Wawona, built by Galen Clark, 1870.



Bridal Veil Meadow, on the route of the ancient Pohono Glacier, and now reached by Pohono Trail. Such sunny glacial flats, large and small, telling of old lakes long since transformed by stream-wash, are come upon everywhere below timber line, on forest trails or among the upland granite domes. Homes of flowers and deer, musical with the song of birds, they are among the delightful surprises of the Park.

It is a picture one can not afford to miss, and if he comes to Yosemite by rail, as many do, he will lose much of its beauty if he fails to see the Valley from Wawona Road. I do not wonder that every artist wants to paint his interpretation of Yosemite's message from the sublime outlooks on or near this road, as it rises out of the cañon; or that the scene inspires such admirable paintings as Hill, Moran, Jorgensen, and others have made here. But all nature-lovers will indorse Mr. Chase's protest against the cheap, bromidic names given these view-points. It does not add to the inspiration of the scene to be told, "This is Inspiration Point!" There is both good humor and good sense in what Chase says:

Inspiration, in any case, is a timid bird, which appears without advertisement, delights not in sign-boards, and the louder it is whistled for is the more apt to refuse to come. I have heard the spot spoken of by warm and jocular young gentlemen as Perspiration Point; and although that species of witticism is, generally speaking, distasteful to me, I find that I suffer no pang when it is practiced at the expense of this piece of pedantry.—*Yosemite Trails*, p. 28.

Since the Park was opened, in 1915, to private automobiles, an increasing tide of visitors each year reaches Yosemite Valley over the old toll roads, now maintained and improved by the Park Administration. This motor-car travel is pretty fairly divided between the north- and south-side routes. Great numbers enter by Wawona and Chinquapin, and descend from the South rim to the Valley floor just west of Bridal Veil Fall. Cars coming over the Big Oak Flat Road, through Groveland and the Bret

Harte Country, rich in memories of the "Days of '49," drop rapidly down from the Tuolumne Big Tree Grove, via the spectacular viewpoints of the sheer north wall, to the site of the former El Capitan bridge, opposite Cathedral Rocks. Smaller numbers come by Coulterville, that road reaching the Merced level a little west of Cascade Falls, and four miles west of El Capitan. All of these high-level roads will lose much of their incoming patronage when the State of California finishes its new highway from the



The Merced River, three miles above El Portal. The sharp V-shape of the gorge indicates that it was mainly cut by stream erosion, rather than by the glacier which carved the U-shaped cañon of Yosemite above. Along this wild trough, filled with boulders from the cliffs, an excellent automobile road has been built at great cost.

town of Mariposa to El Portal, though the Wawona route will no doubt gain in its actual total because of increased travel from the Valley to the Big Trees. The completion and surfacing of the Mariposa-El Portal Road, as has already been said, will give motorists a low-level boulevard, open all the year, from the San Joaquin country directly on to the floor of the Valley, and without question will quickly multiply present travel totals.

A multitude of Yosemite visitors use the quicker service of the railway, in preference to automobiles on the present steep mountain roads. This number includes, too, the Eastern tourists who have not brought their

motors to California. Leaving the Santa Fé or Southern Pacific system at the pleasant little city of Merced, through "sleepers" carry them over the Yosemite Valley Railroad to El Portal, its terminus, just outside the Park boundary. This road is a noteworthy piece of railway building. A few miles above Merced, it enters the gorge of the Merced River, which it follows for the rest of its seventy-eight miles, as the cañon sinks deeper into the range. For most of this length, it was blasted out of the solid granite, or cleated upon wall of the gorge. Below it, the Merced winds and plunges in a narrow, tortuous bed, which is dammed here and there to supply power for quartz and lumber mills. Gold mining has been in progress here for seventy years, the old placer workings, of which the river-channel still shows many scars, having long since given place to underground mines.

From El Portal, automobile stages run not only to Yosemite, but also to the Merced and Tuolumne Groves of Big Trees. These small areas contain some fine trees, and the journey to them is one of great interest. Even if there were no Giant Sequoias in prospect, the ride would be worth while. The road, as it climbs the hills, unfolds magnificent views of Yosemite and the lower Merced Valley. The forests of pine, fir and cedar through which it passes are among the most interesting in the State.

A ride of twelve miles from El Portal, over a remarkable automobile



Cascade Falls, four miles west of El Capitan.



Bridal Veil Fall, seen in early Winter from the south-side road.

celebrated mountain highways in America. It deserves its fame. From El Portal almost to the gates of the Valley, it had to be cut out of the granite hillsides. All about it is a scene of colossal disorder, the work of avalanche and earthquake, filling the cañon with mighty boulders from the cliffs above, over which the swift river foams in continuous cascades. One great waterfall is passed before we reach Yosemite, though among the multitude of cataracts hereabout it is so inconspicuous that the automobile driver may rush by it without calling his passengers' attention to its beauty. This is Cascade Falls, seen on the left, where Cascade Creek pours from the north wall of the cañon, five hundred feet, in a deep recess close to the road. So fine a sight should not be overlooked. It prepares one for the still ampler magnificence of the famous Bridal Veil Fall ahead.

road of easy grades, brings the visitor to Yosemite. This highway up the wild Merced cañon, although it lies almost wholly within the Park, was originally built by the new Yosemite Valley Railroad in 1907, in order to get its passengers from the terminus at El Portal to their destination, Yosemite Village, at the center of Yosemite Valley. It has now been turned over to the Park Administration, a gift to the Government, which should itself have built a road so necessary for public convenience. For the heavy travel has now compelled Congress to widen and regrade it, at a cost of \$325,000. The work has been admirably done under direction of the Superintendent of the Park, Mr. W. B. Lewis; but to preserve it from destruction under the increasing traffic, a further appropriation is urgently needed for surfacing it. The road is one of the most



Winter Sports in Yosemite. Skiing and snow-shoeing draw many parties to the Valley each Winter.



Bridal Veil Fall, the Indian Pohono. Dropping 620 feet, with 200 feet of cascades below it, this fall is noteworthy in its setting, and perhaps the most graceful in form of all the Yosemite catarnets. Note the "comets"—arrow-like masses of water shooting out from the fall.



Cathedral Spires, massive granite pinnacles east of Cathedral Rocks.

Soon, quitting the narrow cluttered wildness of the lower river, the newcomer is face to face with the ordered peace and glory of Yosemite itself. Gratefully, silently, he breathes the very magic of the Enchanted Valley. For here, fully spread before him, is that combination of sylvan charm with stupendous natural phenomena which makes Yosemite unique among earth's great pictures. He sees the cañon's level floor, telling of an ancient glacial lake that has given place to wide, grassy meadows; fields of glad mountain flowers; forests of many greens and lavenders; the fascination of the winding Merced, River of Mercy; and, gleaming high above this world of gentle loveliness, the amazing gray face of El Capitan, while Pohono drops from a "hanging valley" superbly sculptured, and so beautiful that he may well deem it the noblest setting Nature has given to any of her famous waterfalls. No human architect of landscape could have devised so perfect a composition.

Here, too, at the very gates of the Valley, we find an invaluable key to the problem of its origin. As we followed up the Merced, we have thus far seen it everywhere a turbulent cañon stream. But at the base of Cathedral Rocks its character changes. For seven miles above that point, it is the most peaceful of meadow-bordered rivers, with only a few feet of fall as it meanders indolently down the level valley floor from Happy Isles. A little easy investigation, for want of which, however, some eminent scientists have gone far astray, explains the extraordinary change.

At the place just mentioned, where El Capitan bridge once stood, and where its piers may yet be seen, a broad ridge of glacial debris, now covered with young forest, and notched by the river channel, stretches from the talus slope below Cathedral Rocks a quarter of a mile across to the rock slide, or earthquake talus, west of El Capitan. It is largely buried in silt and river gravel, but about twenty feet of its height is visible on the upper side, and twice as much



Leopard Lily (*Lilium pardalinum*), a gorgeous orange- and - purple member of the Lily family, which frequents the lower valleys of the Park.



Cathedral Rocks and Spires, from the Merced River near Rocky Point.



El Capitan and Three Brothers, seen from the moraine at the foot of Cathedral Rocks. Tourists of the class that finds its chief out-door interest in discovering zoological resemblances in natural objects have dubbed El Capitan "the Crouching Lion of Yosemite." This is a misnomer, as the splendid huge rock is obviously an elephant!

below. So solid and level an embankment of soil and boulders, some of which have been freighted down from the sea-beach strata back on the highest peaks, and are of rock wholly different from the unbroken areas of granite now embracing the entire Merced cañon, is unmistakably a glacier's record. Had Prof. J. D. Whitney noted it when, as State geologist, he conducted his famous Yosemite survey, fifty years ago, he would



A Glimpse of North Dome, from one of the beautiful forest roads in Yosemite Valley.

not have made the blunder of his life by denying that the Valley was due to glacial action, or said: "There are below the Valley no remains of the moraines which such an operation could not fail to have formed." For in fact this compact earthwork is simply a terminal moraine, deposited by the great Yosemite

ite Glacier at the point where the last of its several advances stopped, and from which its final slow retreat began.

The line of the moraine, later geologists tell us, practically coincides with, and covers, a granite bar, or sill, which reached from El Capitan to Cathedral Rocks, and formed the dam of the ancient Yosemite Lake. This body of water had the same history as hundreds of other cañon lakes still to be found in the High Sierra, occupying the depressed treads of the huge glacial stairways. Deep basins were quarried by the glaciers wherever inflowing branch glaciers greatly augmented



The "Back Road," on the south side of Yosemite. The trees shown are chiefly California Black Oaks (*Quercus kelloggii*), a deciduous species that does much to beautify the Valley floor. Its acorns supply bread to the Indians, and are prized by squirrels and woodpeckers.

their mass and weight, with a corresponding temporary increase in digging power. Glaciers alone produce these rock-basins. Lakes such as Merced and Washburn, above Yosemite, and filled lake-beds such as Yosemite and Hetch Hetchy Valleys, are found only in the tracks of the vanished ice-streams. River erosion never cuts such hollowed steps in water-channels. It required the long scouring of incalculable moving ice-masses, armed with vast rocks plucked from their beds, to prepare the cañons for the low-set lakes, and for the level valleys of the later time.

Thus the sudden change in the Merced River, from a quiet meadow stream to a brawling mountain torrent, recalls vividly to the modern student that distant day when the receding glacier left behind it a beautiful lake, seven miles in length and probably four or five hundred feet deep, walled by perpendicular cliffs rising more than three thousand feet, and dammed by a rocky moraine overlying a granite dike. Where the lake ended, the Merced cut an outlet for itself through the moraine. This low



Aeroplane View of Yosemite Falls. The upper cataract, termed by John Muir "the noblest display of falling water in the Valley, or perhaps in the world," hangs in a wide recess which the old Yosemite Glacier dug nearly half a mile back into the north wall. The rectangular jointing in the granite clearly seen here enabled the glacier to undermine and overthrow huge blocks of the rock. But east of the falls the joint-planes cease, leaving the solid projecting mass of "Yosemite Point," though very limited local fissuring blocked out the spire known as Lost Arrow, seen on the right. At the close of the glacial period, the shadows of the cliff west of this deep cove long kept alive a small residual glacier, which pushed its ice cascades down the little cañon on the left, where now a horse-trail zigzags to the top of the fall.

pass is also used by the south-side road, where it skirts the river to-day. The lake itself, probably within the last two or three hundred years, if we may judge by the trees growing where once was only water, has filled up with rich alluvial soil, brought down mainly by spring freshets from near-by heights, rather than by the larger river. To this source we owe the fertile valley floor, with an inestimable part of the beauty of Yosemite.

That the extraordinary depth and form of Yosemite Valley, as well as of Hetch Hetchy and a few other moat-like mountain vales presenting the Yosemite type, and therefore generically called "yosemites," are mainly due to glacier-plowing and lateral glacier-plucking, which deepened and widened river gorges originally cut by water erosion and existing long before the glacial epoch or epochs, is a conclusion now so strongly fortified by observed facts that few geologists any longer dispute it. If they differ at all, it is as to the extent of such action, and the preparation by which other geological factors, chiefly arising from localized peculiarities of rock-structure in the Sierran granites, may have facilitated it. Thus some scientists believe that the main Yosemite Glacier reached little below El Capitan; others find evidence that convinces them it found its way to the foothills. Government experts and others have for years been making a minute examination of the region, and gathering data which should solve the deepest mysteries of its history. But the main proposition of predominant glacial influence can hardly be deemed as any longer at issue.

Such agreement, however, is of comparatively recent date. It was Clarence King who first ascribed the great cañon to the glaciers. John Muir, after establishing by his exploration of the Illilouette head-basins the important but long-disputed fact that true glaciers still exist in the Sierra, though fast dwindling in extent and power, read from the record broadly carved upon the upland abundant proofs, as he contended, that all its cañons, with most of the other outstanding features of the range, were the work of ancient ice-streams. Prior to these pioneer "glaciologists" some fantastic theories were held. One attributed the Valley to an explosion of superheated granite domes, and the elaboration by river erosion of the gash thus created. Another explained it as a rent caused by seismic violence, which later was partly filled up with rock debris and stream wash. But the most interesting of these guesses, and one that for years found wide acceptance because of the eminence of its author and the violence with which he denounced the glacial hypothesis, was the "fault-block" contention of Prof. Whitney. Said that once famous geologist:



Cliff at Head of Yosemite Falls, showing the vertical cleavage joints which have guided the glacial sculpturing and made possible the sheer walls of Yosemite, Hetch Hetchy and similar cañons.

A more absurd theory was never advanced than that by which it was sought to ascribe to glaciers the sawing out of these vertical walls and the rounding of the domes. Nothing more unlike the real work of ice, as exhibited in the Alps, could be found. Besides, there is no reason

to suppose, or at least no proof, that glaciers have ever occupied the Valley, or any portion of it, so that this theory, based on entire ignorance of the whole subject, may be dropped without wasting any more time on it. . . . We conceive that, during the upheaval of the Sierra, or, possibly, at some time after that had taken place, there was at the Yosemite a subsidence of a limited area, marked by lines of "fault" or fissures crossing each other somewhat nearly at right angles. In other and more simple language, the bottom of the Valley sank down to an unknown depth, owing to its support being withdrawn from underneath.—*The Yosemite Guide Book*, pp. 73, 74.



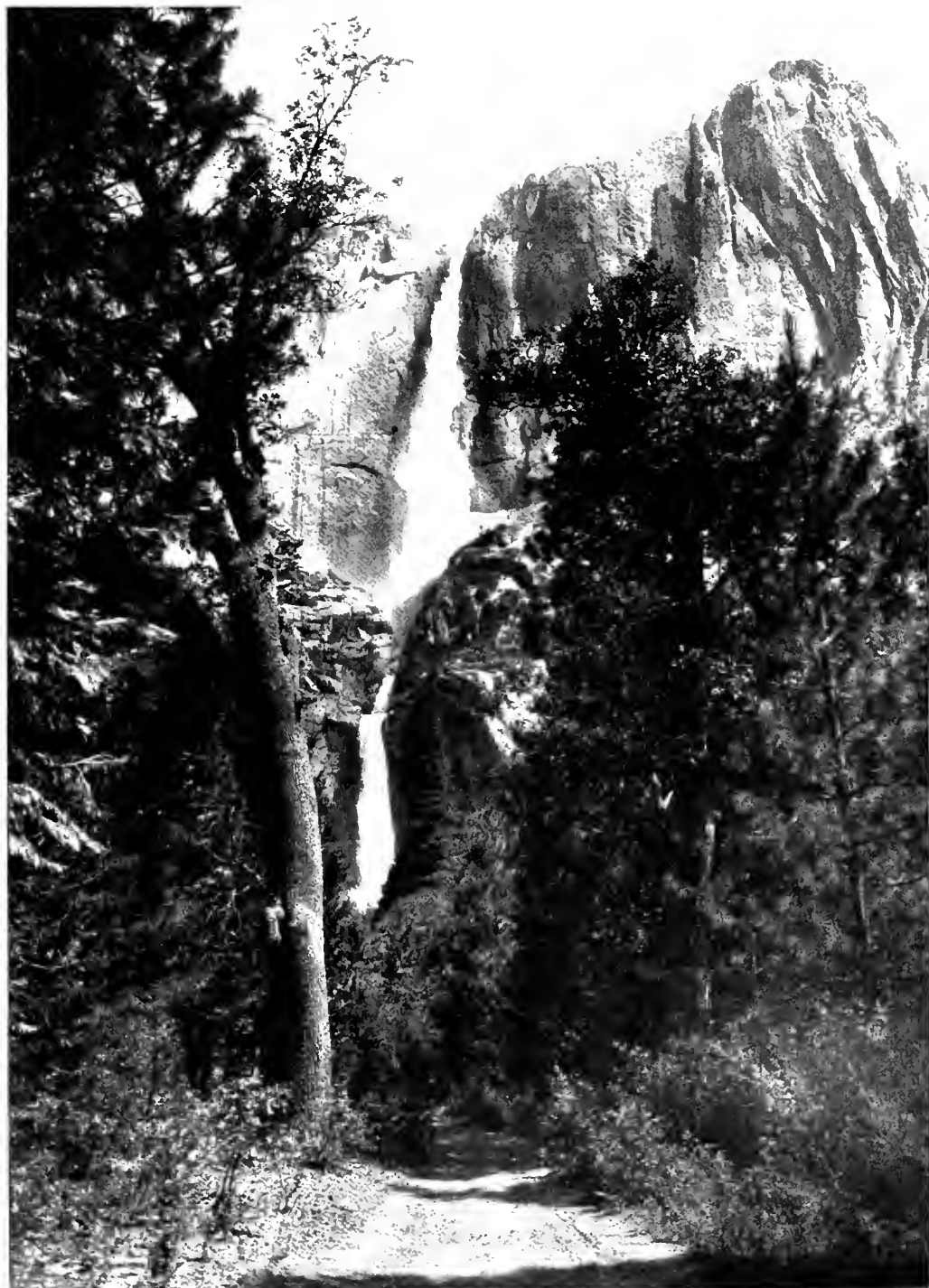
Lost Arrow Trail, east side of Yosemite Creek.



Upper Yosemite Fall, seen from Yosemite Point Trail. In its drop of 1,430 feet, the stream, even at flood, becomes a cloud of spray, which the wind catches as on a cushion, and sways from side to side.

Had Whitney's examination of the Valley been thorough enough to take note of the old moraine below El Capitan, it is probable he would not have written those words. And yet he had other evidence that should have prevented his error. El Capitan Moraine and the old Yosemite Lake which it helps us to reconstruct are far from being the only reminders of the Valley's glacial history. Most striking of all, the hanging valleys on its walls are no less clearly of glacial origin, and tell us of an epoch when ice was irresistibly modeling the landmarks above, as well as digging deeper the vast cañon below.

As we pass Bridal Veil Fall, we note that it drops, not from a flat plateau above, nor from a narrow cleft in the wall, but out of a high side-valley, which in turn is framed by lofty cliffs. The U-shape of this broad valley is so clear that we at once perceive that it, too, must have been scoured out by a glacier, rather than by Pohono Creek, which could have cut only a V-shaped gorge. Its sculptor, in fact, was a minor glacier, mighty enough to dig a splendid wild valley more than fifteen hundred feet deep, but not powerful enough to sink it to the bed of the main cañon. Hence, as the larger glacier shrank in bulk, and ceased to fill the greater Valley, the Pohono Glacier was left "hanging" on



Yosemite Falls, seen from trail through the pine and oak forest that skirts the north wall of the Valley. The upper fall, beginning 2,565 feet above the Valley floor, drops 1,430 feet; the lower fall, 320 feet, with several smaller falls between. Yosemite Point, 2,935 feet, is on the right, and the tall granite spire in front of it is the "Lost Arrow" of Indian legend.



Middle Yosemite Fall. Not easily reached and seldom visited, this is the largest of several cataracts in the deep box cañon between Upper and Lower Yosemite Falls, and has an estimated drop of more than 100 feet. In the view on page 83 it is seen immediately above the lower fall.

above its falls, and beyond the old Tioga Road, he discovers a fine cluster of glacial cirques, stretching around from the north side of Mt. Hoffman, along the southern slope of the Merced-Tuolumne divide, and forming a mountain-walled basin, almost circular, and five or six miles in diameter. In outline it is like the spreading crown of one of the cañon live-oaks that cover the earthquake talus at the foot of the Yosemite wall, and beautify the adjacent upland roads and trails. This characteristic abandoned home of a minor glacier no longer holds its permanent névé.

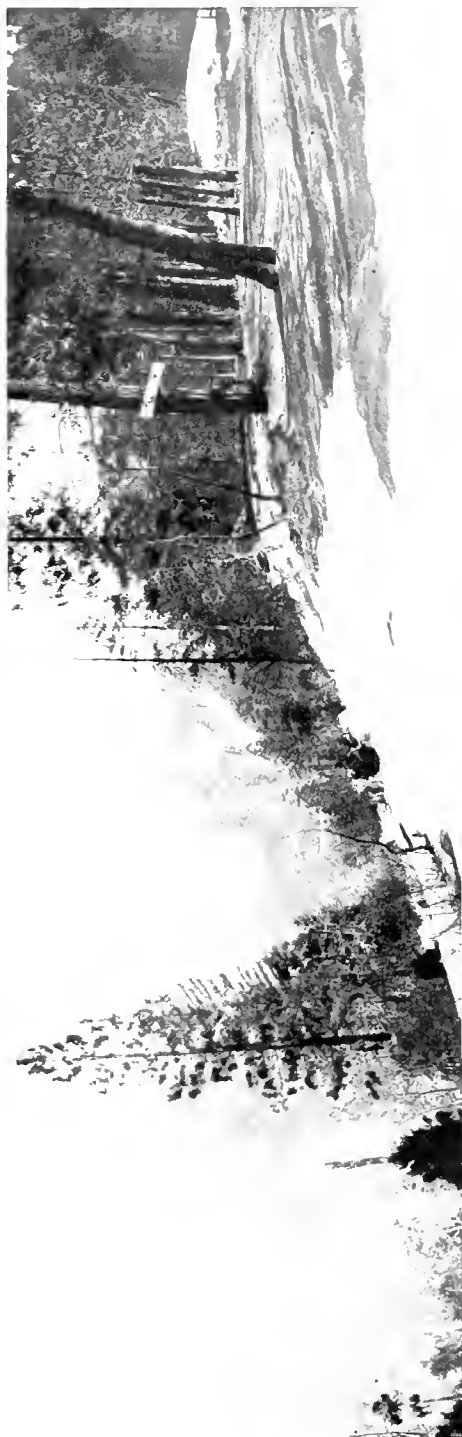
the side, to drop its ice and rock in avalanches upon the trunk glacier below. Finally, both glaciers vanished, with increasing mean temperature and decreasing snowfall. Of their cañons one was occupied by the typical glacier-made lake of Yosemite, four thousand feet above the sea; while the other, for want of icebergs to drop into the lake, just as plainly declared its origin by flinging out a glacial banner, the most graceful, though far from the largest, of the Yosemite waterfalls.

Other famous cataracts hung high on the Valley walls repeat the story of Bridal Veil. Yosemite Falls, at the center of the north wall, and Illilouette, on the south wall at the head of the Valley, are the most important in volume and length of season, telling by their well-defined hanging valleys and fan-like amphitheatres, set deep in the highlands, that they, too, are glacier-born. No more enjoyable occupation can be found for part of a Yosemite vacation than to trace the old glaciers to their sources in the Hoffman and Merced spurs of the main Sierra.

If one follows up Yosemite Creek,



Summit of Mt. Starr King, showing the exfoliation of the concentric layers of granite by weathering.



Yosemite in Winter. View from Artist Point.

El Capitan.

Eagle Peak.

Yosemite Falls.

Yosemite Point.

Indian Cañon.

North Dome.

Halt Dome.



Yosemite Village.

Merced River.

Royal Arches.

Tenaya Cañon.

North Wall of the Valley, seen from the talus luck of Yosemite Village. The trail to the top of Yosemite Falls and Yosemite Point climbs out of the Valley over the wooded earthquake talus seen in this view below Eagle Peak, follows the second bench eastward to the foot of the upper fall, and then, by many zigzags, ascends the small glacial cañon west of that cataract.



Lower Yosemite Fall; drop 320 feet.

It is to-day merely a temporary reservoir, sometimes emptied long before the autumn rains begin. There the winter snows are held until it pleases their parent, the Sun, to transform them into summer floods, and send them, singing, down the valley to join the Yosemite chorus. Yosemite Creek now flows to its fall amidst a wild panorama of gray, barren domes and fir-covered moraines. But here for centuries a shallow glacier, fifteen miles in length and several miles wide, crept slowly from the Mt. Hoffman Range to meet the great ice-stream of the Merced; and when the trunk glacier sank low in its cañon, the north-side feeder dug back its section of the wall until it had quarried a deep branch cañon, in which Yosemite Upper Fall now thunders its own chapter of the glacial story, king of all the world's waterfalls in height and stateliness.

How easily the Yosemite cliffs were undercut and torn away by the blows of avalanches from the glacier above may be guessed from the pictures on pp. 80, 81, showing the wall so deeply fissured by vertical and intersecting cleavage planes that it is merely a standing pile of huge rectangular granite blocks, ready to be tumbled over by any power that can.

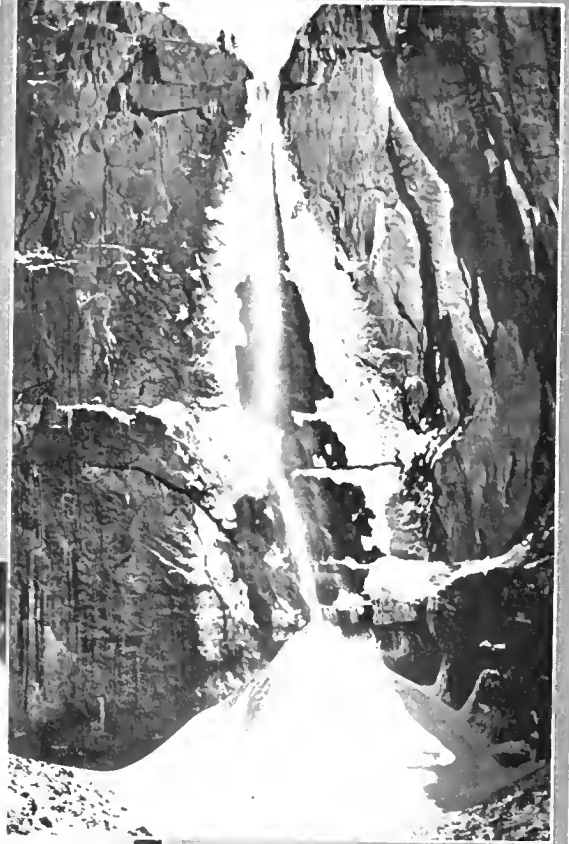
The Hlilouette watershed is larger than that of Yosemite Creek, and even more interesting, as rimmed by higher mountains. From the "Long Trail" approaching Glacier Point, as well as from the hotel there and the ridge south of it, we get many fine views of the deep lower valley of the Hlilouette, encircling Mt. Starr King, and inviting us back to its fountain basins sunk in the west flank of the Merced Range. There Mt. Clark, and Gray, Red and Merced Peaks, accent as noble a ring of cirques as we shall find below the very crest of the Sierra. This watershed, once occupied by a broad river of ice, is now a land of sunshine,—of flower-meadows, shining domes, and densely forested converging moraines, the whole walled by snowy mountains that rise to elevations of eleven thousand feet. Some idea of it may be had from the illustration on page 22. But its wonder and beauty are beyond the power of photography. The best general view is to be had from Mt. Clark, or the east slope of Mt. Starr King, whence one carries away a lasting picture of what a glacier can do in its vocation



Hilonette Fall, viewed from its cañon below. This fine waterfall has a drop of 370 feet. It is a hard climb up Hilonette Cañon from the Merced River to the foot of the fall, which may be seen more easily from above, on the Long Trail to Glacier Point.

as a landscape engineer.

Differing from these three important cataracts in their manner of birth, but none the less proclaiming a glacial origin, Vernal and Nevada Falls, at the head of the Valley, are the largest in volume of all the Yosemite group. Instead of falling from their own hanging valleys, backed by independent basins, they are part of the Merced itself, and drop from giant steps in the river's glacial stairway. These steps, like the



Ice Cone at the Foot of Upper Yosemite Fall. This volcano-like hill rises each winter to a height of four or five hundred feet, formed by the freezing spray and by blocks of ice fallen from the face of the cliff. The mouth of the cone is about 200 feet in diameter, says Muir, who looked down into it from the ledge seen on the right in the upper picture. The two small specks on the side of the cone in the lower view are the late Galen Clark and a companion, who climbed it to get a look into the "crater."

outstanding sheer cliffs of Yosemite, owe their remarkable height and perpendicular faces to the alternation of practically solid granite ridges, lying across the path



Cañon View of Vernal Fall. This is probably the most popular of the Park's great waterfalls. Seen from this point, the famous cataract is framed between the sheer walls of a deep box cañon, while, beyond, the unique domes of Liberty Cap (right) and Mt. Broderick (left), supply a fitting background to so imposing a spectacle. These heights, though a mile away, above Nevada Fall, here seem to stand guard immediately over Vernal.



Le Conte Memorial, at the foot of Glacier Point; erected by the Sierra Club in honor of the late Prof. Joseph Le Conte, the famous geologist and author, of the University of California, and maintained as the Club's Yosemite headquarters. Here a library of out-door literature is accessible to the public.

familiar feature of every important alpine district. But the two renowned falls of the Merced stand quite alone among cañon cataracts in their union of large volume with great altitude, Vernal falling 317 feet, and Nevada 594 feet. Not only are they thus exceptional in magnitude, but the glacier used the local rock formations to make them different. Each has its own special character. Vernal meets all the requirements of an ideal cataract,—a solid sheet of clear water bending easily from the brink of a broad, level granite platform, and offering all the colors of its own delightful rainbows, as the flood changes swiftly from golden green at its brow to optional flashing snows in the sunny cañon below. Nevada presents a striking contrast to such conventional if surpassing beauty. Already churned to foam in a steep, crooked trough, it is shot far out from its narrow cleft, a passionate cloud, seemingly made up of millions of distinct, pearl-like drops; and midway in its descent it strikes the sloping cliff, spreading into a wide “apron” of still more dazzling whiteness. So splendid are these singing, rainbow-building children of the glaciers.

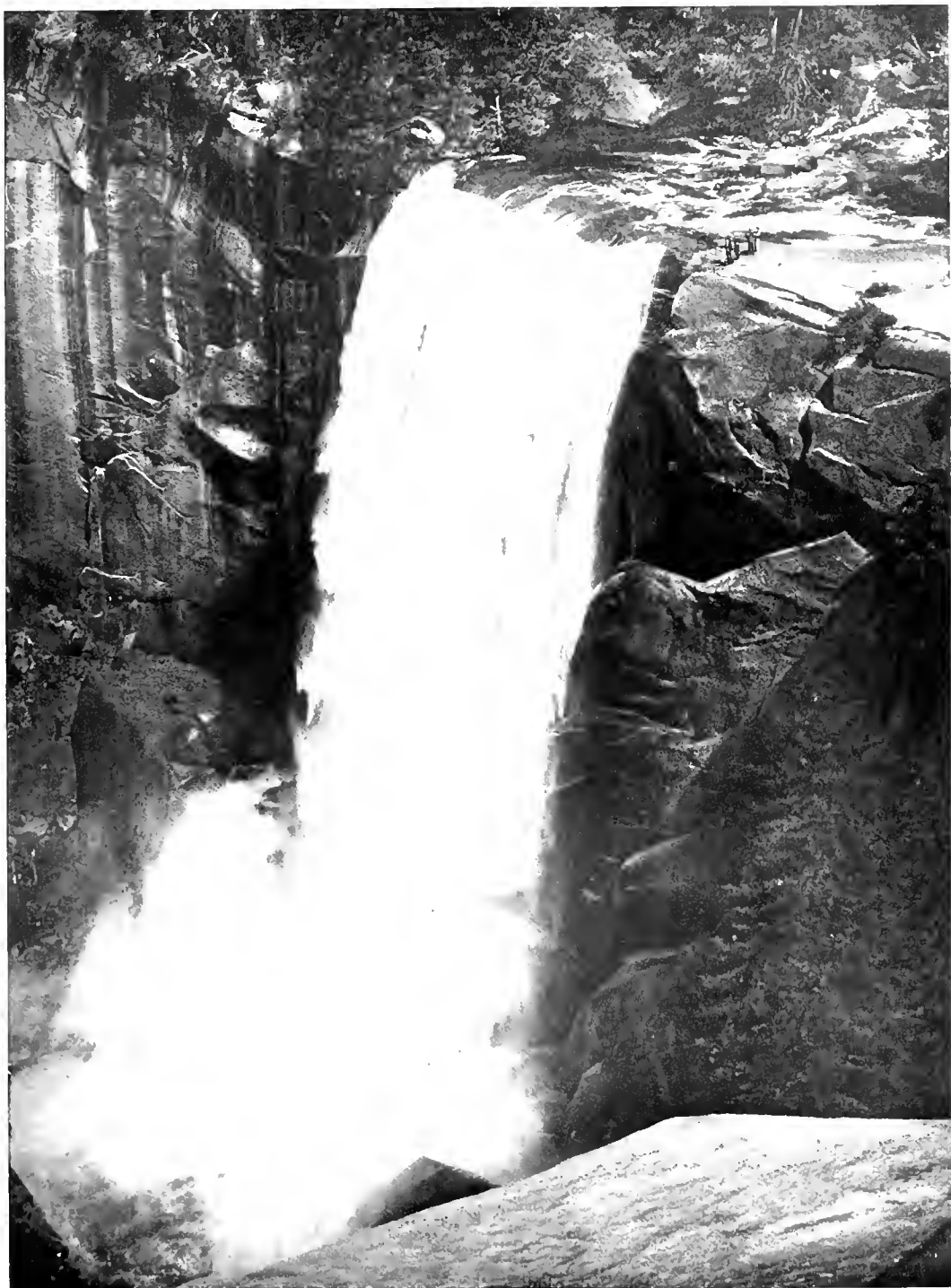
The record of these falls is corroborated by the rock-basins which the gla-

of the ancient Merced Glacier, with areas of looser rock, vertically jointed, and therefore readily disintegrated by the ice.

Glacial cañon steps as high as these are exceedingly rare. Hence cañon waterfalls of the height of Vernal and Nevada are elsewhere almost unknown, while cliff cataracts of even greater fall, dropping from hanging valleys on the sides of trunk-glacier cañons, are a

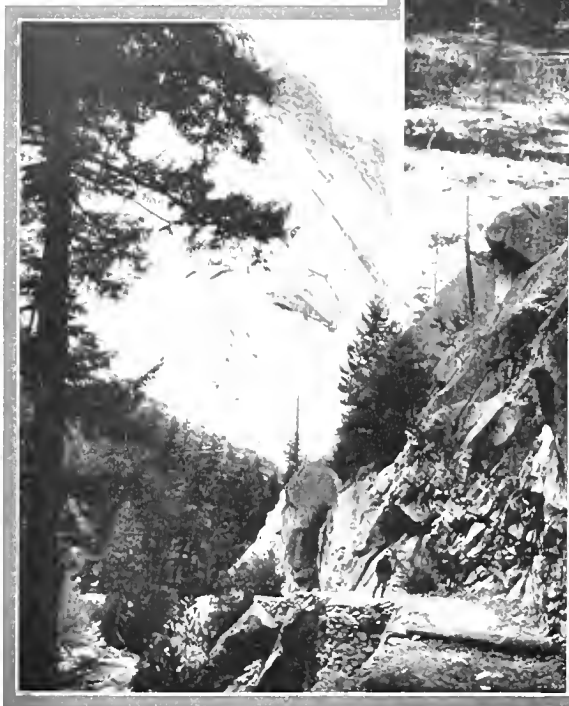
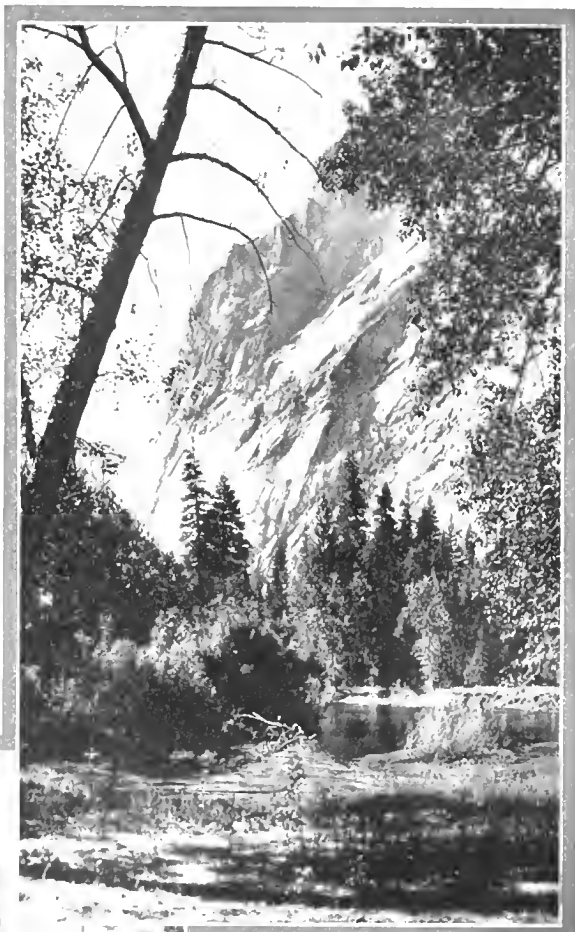


At the head of Nevada Fall. Here a projecting ledge, guarded by an iron rail, enables visitors to study the wild flood at close range as it drives out from its steep trough, breaking into “comets” and huge pearls of whitest spray.



Vernal Fall, from Clark's Point, on the horse trail. Drop, 317 feet. Although the most conventional of the great falls in Yosemite, Vernal offers a magnificent picture, both in its setting and in its wealth of color. The golden greens and blues of the steadily falling stream, its shooting "comets," clouds of spray, and circular rainbows, make it an ideal study, well worth many visits.

acier scoured out on their plateaus, just as it hollowed the basin of Yosemite Lake itself. Emerald Pool, the little tarn immediately above Vernal Fall, is hardly a stone's throw across, but unmistakable. River erosion could never have fashioned so perfect a bowl. A mile higher up, beyond Nevada Fall, the basin was three miles long, holding a lake that has now given place to the charming vale of Little Yosemite. Here bare cliffs and domes frame another level valley of meadow, forest and lazy river, all on about one-half the scale of the greater Yosemite below. Other yo-



Glacier Point, jutting into Yosemite Valley at its junction with the Merced-Hillionette cañon. Seen either from the Valley floor or from the trail to Vernal Fall, this massive cliff is the stateliest headland of the south wall. Its precipitous faces are due to vertical joint-planes.

semities lie beyond, until we reach the splendid glacial lakes, Merced and Washburn, far up the cañon. These, too, in time will fill with detritus from the hills, and become delightful valleys of this type. Nature abhors barren waters.

Glacial history is also written plain on the two "domes" that rise just north of Nevada Fall, called the Cap of Liberty and Mt. Broderick. These are simply masses of unfissured granite, too large and solid for the glacier to plane away, though it gouged out the vast beds of jointed rock in which they lay; and as it swept over them, it shaved down their east slopes, so that one may scale them with little difficulty, and find glacial boulders on their tops which tell by their rock character that they have traveled hither from the snowy summits of the range, a score of miles to the east.

Yosemite Valley offers many other convincing particulars of the life of its great Merced Glacier. The beauty of its cliffs is no more obvious than is their testimony regarding their origin, outline and sculpturing. Their perpendicular fronts and projecting angles, narrowing

the Valley here, or over-towering its deeper recesses there, tell unmistakably of the glacier's work as a giant sapper and miner. But that work must not be credited to the ice-stream alone. It was made possible by the extreme mingling of zones of jointed and unjointed granites. The sculpturing of these walls was carried on first by the ice, and later by all the agencies of weathering,—water, frost and snow. Where the valley contracts, we find unfissured masses that resisted the stresses of the cooling earth, and in the glacial age were able equally to withstand the action of ice. Here El Capitan and Cathedral Rocks, rising opposite each other at the Valley's narrowest part, were undivided blocks too vast for the glacier to remove. So Yosemite Point confronts Union Point, and the splendid prow of Glacier Point the projecting pedestal of the Half



Overhanging Rock on the Half Dome, nearly a mile above the floor of Yosemite Valley. Tenaya Cañon is seen below.

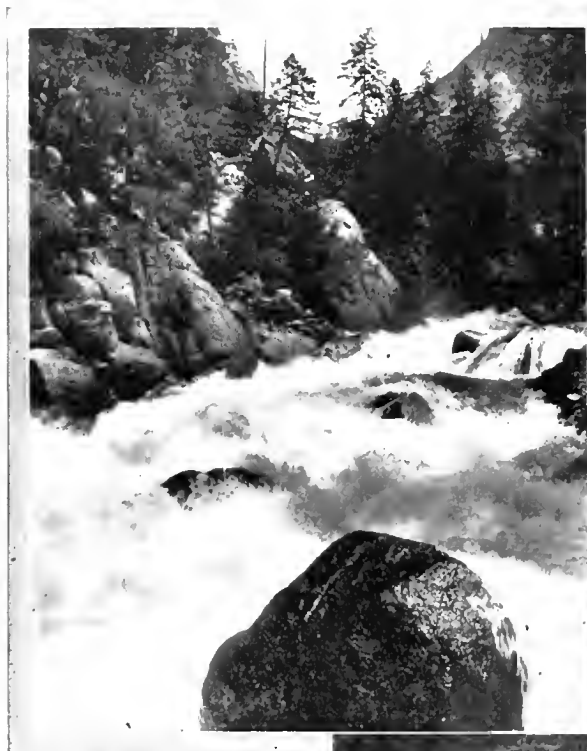


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"Watch Me!" Even the Yosemite bears get the climbing habit.

Dome. In the areas of abundantly fissured rock separating each of these pairs of opposing cliffs from the next, the glacier took advantage of the vertical and horizontal jointing to undermine and cut back the Valley walls. Their varying cleavage planes, with the occurrence of smaller unjointed masses, were set out in an infinite variety of gables, pinnacles and spires.

Where the jointing was vertical, the ice left the sheer faces of Glacier and Yosemite Points and the Sentinel. Where it inclined, the Three Brothers, with their sloping steps, resulted. Alternation of fissured and massive granites gave us the deeply trenched Cathedral Rocks. Purely local solidity surrounded by a fissile structure is represented in Cathedral Spires and the



The Merced at Happy Isles—two beautifully wooded islets at the upper end of the Valley, where the river rushes out of its narrow cañon below Hittquette and Vernal Falls.



Lost Arrow, as well as in such clefts as the Fissures and the gap separating Washington Column from the Royal Arches. Much of this detailed sculpture, of course, has been the result of weathering since the retreat of the glacier. To that agency must also be ascribed the splitting off of flat plates from the front of Half Dome, as well as the exfoliation of concentric layers from the top of that and other domes. This, more than the glacial grinding, is responsible for their rounded form.

Any Yosemite visitor who would know the causes of this great Valley will get both instruction and enjoyment by following the Merced River back to, or at least towards, its fountains in the wide amphitheater enclosed between the main range of Sierran peaks and its outlier, the Mt. Clark or Merced chain. Stretching from Lyell and Florence on the north clear around to Red Peak and Triple Divide Peak on the south, every creek may be traced up to a head-basin which an ancient glacier dug far back into the mountain mass. When this sapping and mining went on long enough to encounter a glacier similarly at work on the other side of the ridge, a pass resulted; and over these mountain passes one may cross to-day, at elevations of nine or ten thousand feet, and drop down into the watershed of the San Joaquin or the South Merced, and find there the same types of alpine scenery, sculptured by the same irresistible if slow-moving tools. But where the excavation was not carried through the summit walls, we find merely the huge cirques, driven well into the sides of the



The "Cataract of Diamonds," between Vernal and Nevada Falls.



Little Yosemite, with its bare granite slopes, seen from summit of Liberty Cap, with Half Dome on the left. Here, too, a Jeffrey Pine, more symmetrical than that on Sentinel Dome, has established itself. Mt. Clark is in distance (left).



Nevada Fall (594 ft.), seen from the Zigzag Trail at its side. Strange and fascinating water forms are often assumed by this wild flood, and when the river is at its height in early summer a woman's face and figure are plainly seen,—a veritable "Lady of the Snows."



Nevada Fall, seen from the north wall of the cañon below. In display of power, as the swift Merced River shoots out far from its ledge, this great fall ranks first among the Yosemite cataracts, and many visitors deem it the most beautiful.



Little Yosemite, with Clouds Rest in the distance.

peaks. Out from each of these horseshoe-shaped basins poured, during the glacial epochs, a tributary to the Merced Glacier. To-day almost



Bunnell Point, a remarkable sugar-loaf dome at the head of Little Yosemite.

every cirque holds a tiny lake, from which flows a modest stream, the beginning of one of the "forks" of Merced River. The whole of the vast amphitheater is thus seen to be closely dissected, by the plowing of these glaciers, and the erosion of these streams, into an area of deep cañons and narrow, thickly-set ridges, all converging towards the rock-walled lakes, Washburn and Merced, and sending on their supplies to the profound Yosemite gorge. Down in those cañons, when we explore them, are discovered sunny alpine lakes and scores of loud-spoken cataracts. Sometimes the lakes have filled, and become shining alpine



Lake Merced, one of the finest mountain-walled glacial lakes of the Sierra, in the upper Merced Cañon, four miles above Little Yosemite.



Sunset over Evening Clouds in Yosemite, seen from Union Point, with Sentinel Rock on the left and El Capitan on right.

meadows. Sometimes the straight cataracts have aged into broken cascades, and their thunders softened to the gentler songs of gliding, dashing waters. But everywhere, in polished granite walls and floors as in waterfalls, lakes and lake valleys upon the cañon steps, is the easily read report of a colossal ice-stream.

As Merced Cañon forms the southeast branch of Yosemite Valley, so the still deeper cañon of Tenaya Creek is its northeastern arm. Here the glacial story is less plain, and on first sight, from the heights on either side, it might be overlooked. For above the cañon's lower two miles,—that is, beyond the foot of Mt. Watkins,—it crowds to a narrow box-cañon between that great cliff and the steep incline of Clouds Rest. This might seem to be a sharp V-shaped, stream-cut gorge, rather than to have the broader U-shaped trough commonly left by a glacier. But



On the "Short Trail" to Glacier Point. This trail commands splendid views of Sentinel Rock, Yosemite Falls and the Valley floor.



Domes and Polished Granite Bench at Head of Little Yosemite. The great dome in the center is Bunnell Point, which is shown from the cañon below in illustration on page 48.

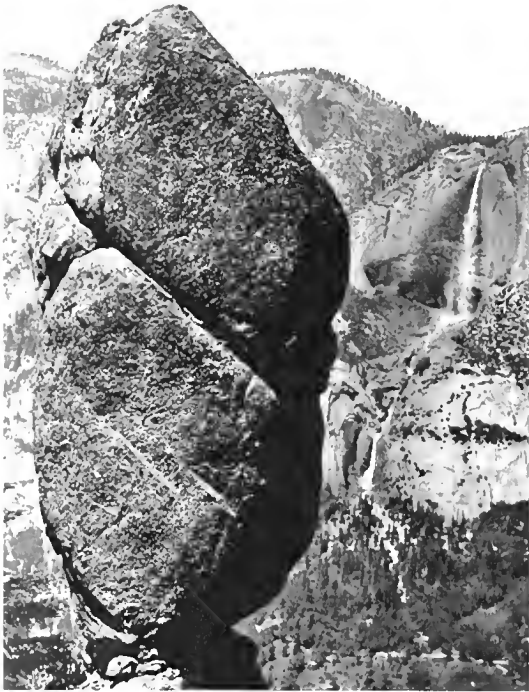


Shining Granite Slopes and Cañon Walls on the Merced, below Merced Lake. The two scenes shown on this page, like the lake itself, seen on page 49, are autographs of the Merced Glacier, still legible many thousand years after its retreat. Over these polished surfaces, often as smooth as a marble table-top, the horses are carefully picking their steps. Note in each view the trail built to give safe footing to the animals.



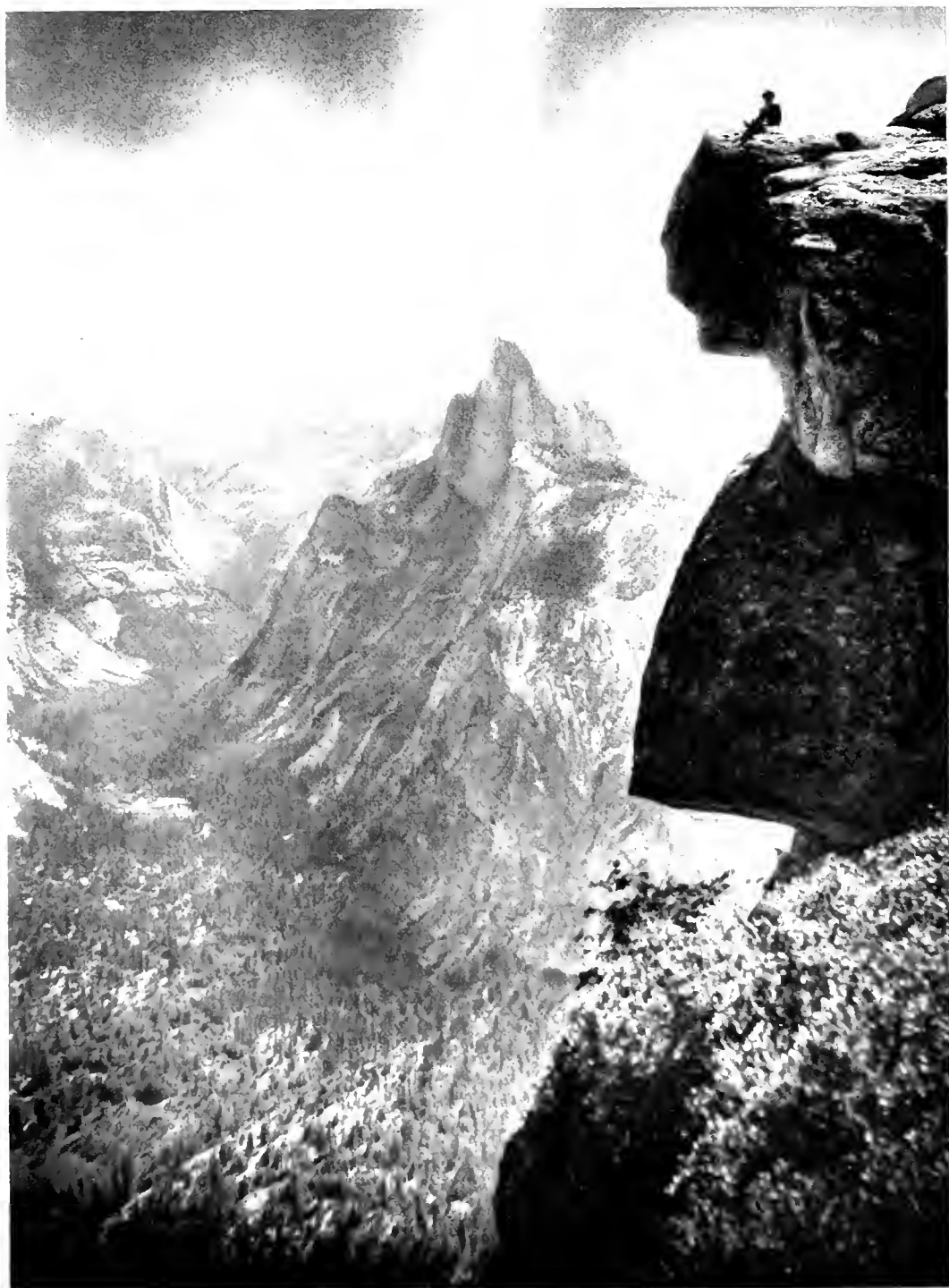
Half Dome at Sunrise, seen from Glacier Point.

a little exploration discovers glacial footprints in the terminal moraines and the lakes and filled lake-beds, with fine connecting waterfalls, that mark a glacier's descent from the Cathedral Peak Range, south of the Tuolumne.



Agassiz Column, a huge balanced rock on the "Short Trail" below Glacier Point.

We have hardly entered the cañon, indeed, before we are reminded of El Capitan moraine and the enclosed Yosemite Lake. A similar boulder ridge, thrown across the cañon here, is traversed by the road as it carries visitors on their early morning trips to see the sunrise reflections in "Mirror Lake." This lakelet evidently occupies the lowermost of the glacial steps. It is a mere reminder of its former size, the delta of Tenaya Creek having stolen a mile from its upper end. Farther up the cañon, below and above Mt. Watkins, stream sediment has already turned other lakelets into meadows. But eight miles east of Yosemite, at the head of the cañon, Tenaya Lake not only presents one of the



Tennaya Cañon and the Half Dome, seen from Glacier Point. The perpendicular clevynge of the Half Dome by weathering is well shown. Mirror Lake lies below, and beyond rise Mt. Watkins, left, Clouds Rest, right, and Tenny Penk, eight miles away at the head of the cañon. The late Galen Clark, age 94, seated on "Photographers' Rock."



A Characteristic Dome Landscape: view north from Glacier Point, looking across Yosemite Valley to North Dome, Basket Dome, and Mt. Hoffman. In the foreground, note the deep fissure separating Washington Column from the Royal Arches.

most fascinating views in the whole Park, but also recalls, in its polished granite walls and domes and pavements a very different scene,—a picture of the old Tuolumne Glacier, split against the east front of Mt. Hoffman, and sending part of its immense ice-flood down Tuolumne Cañon, to quarry Hetch Hetchy, and the rest over the low divide into the Tenaya basin, to form the main ice supply of Tenaya Glacier and help excavate Yosemite Valley. The deeply plowed track and surprising work of this glacier

are well shown in the illustrations given on pp. 16, 27, and 49.

Thus Tenaya Cañon forms no exception. Its narrowness between Clouds Rest and Mt. Watkins, seen in Prof. Le Conte's pictures on page 46, is plainly due to the solidity of the huge inclined strata of the former, and the fact that the latter is a single block of massive granite, rising as high, as sheer and as unbroken as El Capitan, which it greatly resembles. The striking contrast Tenaya Cañon thus presents to Yosemite Valley is lucidly set forth by Dr. François E. Matthes.



Sentinel Dome, on the Plateau above Yosemite Valley, south of Sentinel Rock. On the summit is seen the lone Jeffrey Pine which is shown at large on the opposite page.



Jeffrey Pine on Sentinel Dome. Such outposts of the forest are found on nearly all the bare granite bosses that stud the Yosemite uplands. Starting life where no life would seem possible, they bore down into the cleavage joints, and draw moisture from the rock itself. Above, they grow slowly, turning their few stocky limbs eastward with the prevailing winds. The heroic tree shown here is doubtless several hundred years old, though hardly more than twenty feet high.



Yellow Pines, the predominant tree in Yosemite Valley

the noted expert of the United States Geological Survey, who has for some years been in charge of the Survey's thorough investigation into the geological history of the Yosemite region:

The Yosemite Valley evidently was carved from prevailingly fissured materials in which the ice was able to quarry to great depth and width. Tenaya Cañon, on the other hand, was laid along a rather narrow zone of fissuring, flanked by close-set, solid masses; and the glacier that flowed through it, while permitted to carve deeply—more deeply even than the mightier Yosemite Glacier,—was impeded in its lateral excavating, and has been able to produce only a narrow, gorge-like trough.—*Sketch of Yosemite National Park.*

The full report of Mr. Matthes' Yosemite studies, which the Geological Survey expects to publish before the close of the present year, has long been looked forward to. Pending its preparation, he has from time to time made public, in the *Sierra Club Bulletin* and elsewhere, preliminary observations of great value. In one such passage, he cites the progress of geological study in the Yosemite Sierra since the days of such pioneer glacierologists as Clarence King and John Muir. I take pleasure in quoting this authoritative statement, as it clearly summarizes its author's deductions regarding matters formerly in dispute:

In Muir's day glacial science was in its infancy, and no man had as yet that perspective of the succession of ice-ages and intervening epochs of milder climate which the world-wide research of the last two decades has made known to us. To Muir and his contemporaries the Glacial Epoch still seemed a single, uninterrupted cycle of glacial conditions that slowly reached a climax, like an oncoming tide, and then slowly waned, the glaciers making many repeated but progressively feeblér re-advances, like the waves of an outgoing tide. To-day we know that the Glacial Epoch, so called, really consisted of several prolonged ice-tides separated by equally prolonged intervals, during each of which the continental ice-sheet and the lesser ice-bodies on our Western mountain ranges shrank back to their sources and perhaps vanished altogether.

In the Sierra Nevada indications of at least two great ice-floods have been clearly recognized by several observers,—two ice-floods that occurred manifestly at widely different times, the later culminating probably only twenty thousand years ago, the earlier, perhaps as

much as several hundred thousand years ago. The evidence is the more readily established as the later ice-flood was the smaller and less extensive of the two and left undisturbed the moraines—that is, the ridges of ice-carried rock debris—that mark the limits of the earlier ice-flood. In no part of the Sierra Nevada have these facts been ascertained with more precision than in the Yosemite region and the High Sierra immediately above it. Thus it is now definitely known that the later ice-flood invaded the Yosemite Valley only as far as the Bridal Veil Meadows, whereas the earlier ice-flood advanced eleven miles farther down the Merced Cañon, coming to a halt a short distance beyond El Portal.—*Sierra Club Bulletin*, Vol. xi., pp. 21, 22.

Many who come to Yosemite late in the season are disappointed when they discover that the long summer of the High Sierra has depleted the famous Merced cataracts, Vernal and Nevada, and perhaps quite dried up Yosemite, Illilouette and Bridal Veil Falls. Hence too much emphasis can not be laid on the fact that the sight and music of these waterfalls, phenomenal as we must regard them, are not the only or the best pleasure which Yosemite has to offer the intelligent visitor. Even though he may not class himself with the "nature-lovers," one must be strangely insensible to the wonder-workings of nature if he fail

to see that the Yosemite picture is of far wider scope and mystery, and of far greater importance and charm, than is voiced even by its falling waters. As often as I have visited the Valley, the marvel of its colossal framing still seems the greater with each return. How such mass and



Climbing the Half Dome. This feat, long deemed impossible, was first achieved in 1875 by George C. Anderson, who, with cable and eye-bolts, built a trail to the top. But avalanches swept this away. In 1919, under the auspices of the Sierra Club and with funds given by a member, the new trail shown here was constructed with iron posts, steel cables, footholds, and, at the steepest point, a 50-foot ladder. The final ascent, 800 ft., over an incline sometimes exceeding 45 degrees, is thus made safe and comparatively easy. The summit, 4,970 ft., above the Valley floor, offers a memorable view of Yosemite, Little Yosemite, and most of the Merced-Illilouette watershed.



The Fissures, a deep gash in the south wall of the Valley, near Taft Point. This was made by the erosion of a small section of highly fissile rock amidst an area of solid granite.

height were shaped to perfect proportion and beauty, instead of mere wild bulk, and how the whole view, seen from almost any point in the Valley, was softened to a landscape blending sylvan grace with tremendous power, must always be a study of surprise, interest and value. And so I repeat that the greatest and finest thing to be seen in Yosemite is the

record of its making, written upon its sculptured walls, accented by its highest summits, and gently told again in the sunny forests and flowery meads of its floor. What a debt to the cold snows of the Sierra, and to the slow, savage ice-streams which they fed! And what forces of primeval world-making molded El Capitan, Half Dome and the Sentinel to survive the glacier's mightiest thrusts! These superb cliffs, perhaps the noblest rocks in the world, withstood the ice as they now endure the storms. Serene and distinguished, they dominate the great Valley, expressing Yosemite's majesty. "The Colorado Grand Cañon," wrote John Burroughs, "is more unearthly, apocryphal; but one could live with Yosemite."



Rangers' Club-House in Yosemite Valley, a gift from Stephen T. Mather, Director of the National Park Service, to the men who are developing and guarding the Park.



Evening Primroses and the Half Dome. These beautiful luminous yellow flowers are a familiar decoration of Yosemite, Hetchy Hetchy and o her valleys in the Park during July, when their buds "pop" open noisily at sunset for a single night of fragrant revelry.



At the Foot of Fernandez Pass in February. Taken on the extreme southeastern border of the Park, with Gale Peak (10,960 ft.) two miles away. This and other snow scenes shown in these pages vividly illustrate the opportunities for winter mountaineering in the sunny Yosemite uplands.



Triple Divide Peak (11,613 ft.), seen from meadows at the foot of Foerster Peak. So called because its permanent snow-fields feed the San Joaquin River and two forks of the Merced.

III.

ON THE CALIFORNIA SKY-LINE

The silence that is in the starry sky,
The sleep that is among the lonely hills.

—William Wordsworth.

I ramble to the summit of Mt. Hoffman, eleven thousand feet high, the highest point in life's journey my feet have yet touched. And what glorious landscapes are about me, new plants, new animals, new crystals, and multitudes of new mountains, far higher than Hoffman, towering in glorious array along the axis of the range, serene, majestic, snow-laden, sun-drenched, vast domes and ridges shining below them, forests, lakes, and meadows in the hollows, the pure blue bell-flower sky brooding them all,—a glory day of admission into a new realm of wonders as if Nature had wooingly whispered, "Come higher."

—John Muir: *"My First Summer in the Sierra."*



THE best way to see Yosemite is from the heights. The wonder and pleasure of this experience draws thousands of visitors each summer to Yosemite Point, overlooking Yosemite Falls, and thence to the still higher north-side elevations of El Capitan, Three Brothers (Eagle Peak) and the North Dome; or, on the south, to Glacier Point, Sentinel Dome and the great outlooks offered by the Long Trail and Pohono Trail. To these comparatively easy ascents from the Valley may now be added the Half Dome, attainable by the new trail at the cost of a little more effort, but not called real mountain-climbing by the real out-door man or woman. All these adjacent elevations can be made on foot by everybody who commands good wind and a fair pair of legs. Other visitors are advised to take horses. It is not well to under-

Mt. Hoffman.

Clouds Rest.

Mt. Clark.



North Dome.

Tenaya Cañon.

Half Dome.

Vernal and Nevada Falls.

Panorama from Glacier Point. Beginning with North Dome and its neighbors on the a semi-circle, embracing the deep cañons of Tenaya Creek and Merced River, the great Yosemite without visiting Glacier Point, which commands one of the noblest and most

estimate either the labor required or the rewards to be obtained. As one rises from the Valley, the view develops unexpected surprises; the opposite cliffs rise with him; new rock forms are discovered, colossal and unique; near-by proportions and distant perspective alike change with increasing altitude; until, at last, from the summits he beholds at his feet a vaster and more wonderful Yosemite than he has ever dreamed of. Few things are better worth while than such a climb. These upland trails are the keys that unlock, not only the secrets of Yosemite Valley, with its cliff sculptures, waterfalls and glacial story, but also the greater mysteries of the higher mountains. No one can ascend the Yosemite heights, under the clear Sierran sky, and behold the panorama which they unfold of the far-away California sky-line, without hearing the call of those snowy peaks and sunny ranges rising in the east. And even if he can not respond in person, he will gain from his broader outlook enduring memories of the grandeur and peace of the mountains, recollections that

... have power to make
Our noisy years seem moments in the being
Of the eternal Silence.



Climbing Mt. Clark.

Splendid views of the High Sierra may be had from Glacier Point or North Dome, and nearer ones from Clouds Rest, east of Half Dome and easily reached by trail from Nevada Fall. Clouds Rest is the highest point on the rim of the Valley. I am sorry for any one who leaves Yosemite without at least visiting Glacier Point. Even here the panorama includes

Mt. Starr King.



Illilouette Watershed

Glacier Point Hotel.

north wall of Yosemite Valley, backed by distant Mt. Hoffman, the camera sweeps through watershed of the Illilouette, and all the heights, near and far. No one should leave interesting landscapes in America.

not only the whole of Yosemite Valley and the neighboring domes, but embraces a score of noteworthy snow-peaks lightly silhouetted against the distant blue.

It is important for the convenience and benefit of all Yosemite visitors that Glacier Point be brought by better roads nearer to the floor of the Valley. Hence it is to be hoped that when the road across Forsyth Pass is constructed, the undertaking will include a branch turning west from the top of Nevada Fall, crossing Panorama Point and the hanging valley of the Illilouette, climbing Glacier Point to the attractive new hotel there, and continuing along the south rim on the route of Pohono Trail, past Sentinel Dome and the best viewpoints over Yosemite Valley. Such a road, besides being many miles shorter than the present roundabout and uninteresting trip via Chinquapin, would quickly become one of the famous scenic highways of the world. I believe it no less feasible than desirable. As to the possibility of obtaining an appropriation for this work, in addition to the Forsyth Pass road, I find the whole matter convincingly summed up in a letter received from the Superintendent of the Yosemite Park. Lack of funds has long hampered Mr. Lewis in his efforts to fit the roads of the Park for automobile travel, and what he says may therefore be commended especially to



On Lake Washburn at Sunset.



On the Overhanging Rock at Glacier Point, with eight feet of snow. Glacier Point, with its plateau well above 7,000 feet, seems destined to become the chief center of winter sports in the Sierra, when the completed State road to El Portal fills the Valley with winter visitors. But to make it easily accessible in winter, early construction of the proposed inclined tunnel from the Valley is needed.

the attention of the California delegation in Congress:

If the proper enthusiasm is placed behind a real road-building plan for Yosemite, the question of a few hundred thousand dollars, one way or the other, is not going to prevent it from receiving Congressional approval. Likewise, unless there is some force brought to bear, any scheme is going to be defeated, and we shall continue on our present course of uncertain annual appropriations, allowing only for the barest needs.

A disappointing lack of understanding recently defeated—for a time, only, I hope,—a worthy effort to make Glacier Point quickly accessible from the Valley floor. This was a plan to drive an inclined tunnel from near the site of the Sierra Club's Le Conte Memorial upwards to near the Glacier Point Hotel on the rim above. The tramway would be wholly underground, thus offering telephone and electric light wires much-needed protection from snow, and carrying passengers from one level to the other in a few

minutes. On every count, the thing seems both desirable and feasible. But it met a storm of protest, largely due to the misrepresentations of a certain popular weekly, which employed a well-known California writer, who might easily have learned the facts, if he did not know them, to expose the project as a scheme to hang a railway on the outside of El Capitan! In time, no doubt, this underground road will splendidly demonstrate its value by carrying many thousands of Yosemite visitors to a better acquaintance with the Yosemite upland in summer, and in winter to the best snow sports obtainable anywhere in California.

Views of the High Sierra from the summits overlooking Yosemite Valley are a poor substitute for the prime enjoyment of days and nights spent among the lofty passes and fascinating alpine meadows nearer the



Looking South from Summit of Mt. Clark to the other peaks of the Merced Range and their glacial cirques. It was in these head-basins that John Muir, in October, 1871, discovered surviving remnants of the great Millonette's branch glaciers, and thus established the fact, till then denied, that real glaciers still exist in the Sierra Nevada. Note the characteristic and almost inevitable cirque-like in the amphitheater of Gray Peak, and the dwarf white-bark pines, forlorn hope of the forest, struggling up the moraines, well above the 10,000-foot level.

backbone of the range, with such ascents as may be within one's time and inclination. Hence the most important thing about the trails out of the Valley is that they invite one on and on, to the grander Yosemite of the far heights.

Visiting the Yosemite Sierra has till recently meant genuine exploration, but with the good trails now opened to many parts of the Park, one can hardly go anywhere below timber line without finding signboards or blazes guiding him to lake or peak or valley. All this is in disregard of the professional climber's fear that his favorite wilds will be rushed by the "mob." The Park Administration wisely aims to make this great na-



Tuolumne Pass,—upper view looking south; lower view, north. Below is seen a snowfield on the slope of Mt. Vogelsang, with advance of Sierra Club pack-train coming into view. Beyond are Rafferty Creek Cañon and Rafferty and Johnson Peaks.

tional recreation ground fully accessible to the public, as well as to the mountain enthusiast. The "mob," of course, will not follow; but mountain parties become larger every year, and with the establishment of lodges at Lake Merced, Lake Tenaya, and Tuolumne Meadows, the number of such companies taking the long trails is likewise multiplying. No season would be long enough to cover all the trails, of which the Park has six hundred miles. Hence it is best to undertake some definite section, knowing that unforeseen calls are likely to be made on one's energy and time. Every section offers enough of interest and wonder to make a summer's vacation a round of unforgettable days.

And if your vacation fall in winter, the Yosemite country will welcome you then quite as whole-heartedly. We have not as yet made winter mountaineering the popular sport it deserves to be; but when it becomes a popular sport in America, as it long has been in Europe, then California's High Sierra, and notably the Yosemite uplands, with their abundant snow



Vogelsang Pass (left) and Vogelsang Peak (11,511 ft.). In the foreground is Vogelsang Lake (frozen), and on the right Fletcher Creek Cañon. This view looks south from Tiutunne Pass.



View South from Vogelsang Pass, looking down the McClure Fork of the Merced to Mt. Clark and the Merced Range.

and steady weather, inviting the climber to explore the lofty mountains easily reached from Yosemite Village, will see the best of it. The fascination of such adventures is shown in the remarkable High Sierra winter scenes reproduced in the following pages by courtesy of Miss Elizabeth Keith Pond, of Berkeley, and her brother, Mr. Charles McHenry Pond, well known



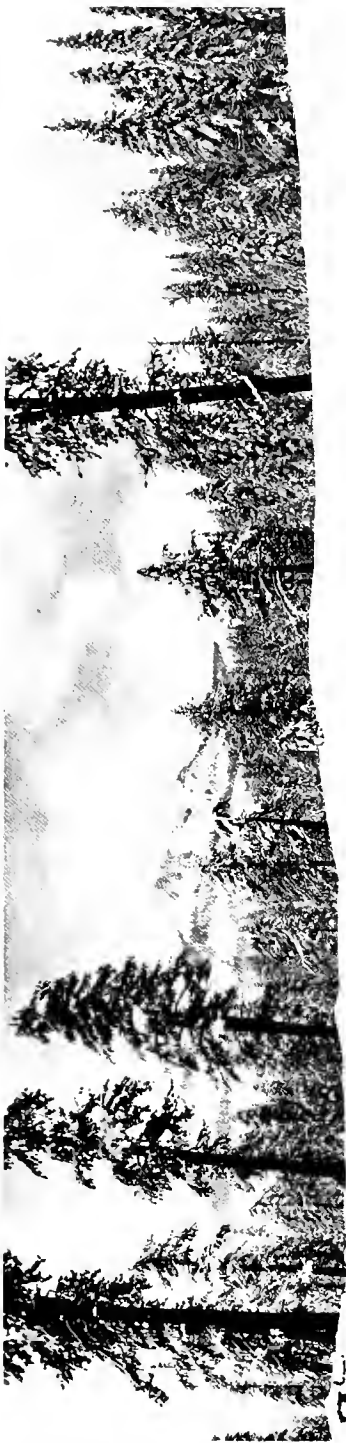
Summer Snow-fields in the Sierra. Upper picture shows party entering Park via Donohue Pass and east shoulder of Mount Lyell. Middle, a view south, near



Forster Pass, across frozen Lake Harriet. Lower, consisting on snow slope near Forster Pass, with Merced Cañon and Mt. Clark in distance beyond.



both as a mountaineer and an aviator. These daring climbers, one February several years ago, made an expedition across the Illilouette basin and over Merced Pass, thence to the top of Fernandez Pass and of Triple Divide Peak, on the southeastern border of the Park. It was an experience few have yet enjoyed, but the story told by these pictures and in Miss Pond's



Mt. Starr King after a February Storm.



Looking South from the Slope of Mt. Starr King, with southern peaks of the Merced Range on the left.



Looking up Lyell Fork of the Tuolumne, with Kuna Crest on the extreme left, Potter Point in the center, and Parsons Peak at the end of the ridge beyond.

charming plea for mid-winter climbing should inspire many to repeat it.

"I am delighted," Miss Pond writes, "that you will call attention to the opportunities in and around Yosemite for winter mountaineering. There is nothing else like it,—such a vast chain of accessible mountains, with their great rivers, forests and meadows under the deepest of winter snows, yet bathed by the warmest of winter suns. For those who love the winter camp in the open, and joys of snowshoes and skii, such a country is ideal.



Pack Train at Vogelsang Pass. Mr. Clark is seen in the distance.

"Take your snowshoes down from the wall, build a sled on skii, and climb to the rim of Yosemite Valley when the snow lies deep over boulders, brush and ice-bridged streams; then away through meadow, forest, and over the pass. Artist, camera and pen cannot present the full beauty of these vast snow-clad mountains under sun, moon or lowering storm; but mental pictures live forever in the memories of those who have camped among them.

"With shoe-packs, strong snowshoes, and durable sled well laden with blankets and bacon, come with us up the Wawona Road in February. You need muscle for the hills, but the sled will glide like a boat on the level, and has the wings of a bird on the down slopes. Take a few days to explore the rim of the Valley, Mono



Winter Trail to Merced Pass, with Mt. Starr King in the central distance and Red Peak on right.



Moraine Meadows in February, with Fernandez Pass on the left and Gate Peak in center.



Rodgers, Electra and Davis Peaks, seen from near Island Pass.

Meadow, and Glacier Point; and while we stand on the summit of Sentinel Dome, we shall choose our route along the slopes of Mt. Starr King, and up the wide, open spaces of the Illilouette, to the southern heights of the Mt. Clark Range. If we are snowed in for a few days, here or there, let

us build a lean-to. When the storm blows over, wind and sun form a new crust, and the going is better than ever.

"The glorious winter days in the High Sierra can not be surpassed. Clouds and snow-showers bring added beauty of color; sunrise and sunset transfigure the landscape with indescribable splendor. Time speeds by. We cross Merced Pass, camp a while in the snow at Moraine Meadows, at the head of South Fork of the Merced, and a few days later stand on Fernandez Pass, more than 10,000 feet above sea-level. It has been a stiff climb in the snow, but worth all the effort, for we seem on the very top of the world, looking over a sea of mighty mountains. Down again we must go, into the upper valleys of the San Joaquin; and another long



A Convenient Crack. Such chance assures frequently offer the only possible trails across the glacier-polished granite slopes.



On Fernandez Pass (10,175 ft.) in February, looking down to the headwaters of North Fork of the San Joaquin.



From the Summit of Triple Divide Peak (11,613 ft.), Mt. Florence is seen far away on the left sky-line; Mts. Banner and Ritter are in the center, and the top of Post Peak is just visible on right.



Kuna Crest, seen from meadows near Mono Pass.

climb brings us up Triple Divide Peak. Here let us camp for several days, to enjoy the most wonderful view of all. The wind may blow, and the snow fall; but there is a rock for shelter, and the brush will burn! Night will be as brilliant as day, for the moon is full, and the stars seem within arms' reach. We lie snug and warm in our blankets on the snow,—No boughs here for beds!—and gaze out over three great mountain ranges. A snow cornice overhangs, so we make a careful descent by cutting steps in the ice, lowering the sled and shoes, and sending the rolls of blankets over the brink. Away they go, out of sight; but we shall find them somewhere in the evening.

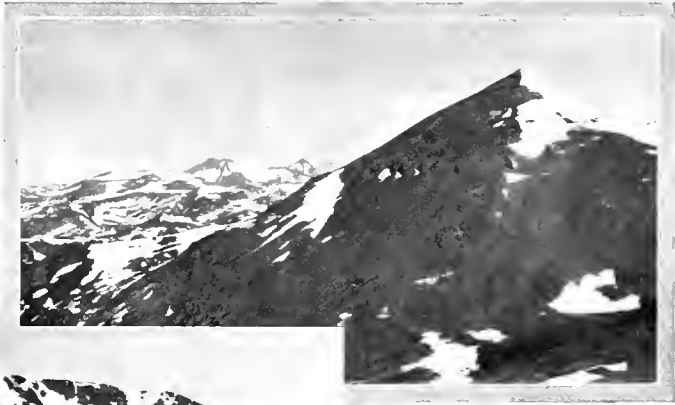
"We are now on the homeward stretch, down the headwaters of the Merced, skimming Lake Washburn on the ice. Another day's climb, up Echo Creek and down the Sunrise Trail, will bring us back to the Valley."

Except for the old Tioga Road, as I have shown, all highways entering the Yosemite Park lead to Yosemite Village, and now, I am sorry to add, end there; travel to the uplands south and east of the Valley, or north of the Tuolumne River, save for the hardy mountaineers who can carry their own blanket-rolls and knapsacks, must be by the horse-trails. Of these there are already 615 miles, with a large extension of the system planned for that day—May it be near at hand!—when Congress shall



Cutting Steps up the Snow-Flinger on Mt. Lyell,—the climax of a long and interesting ascent.

awake to the desirability of dealing justly by this great Park. Meanwhile, several important trails have recently been built. The most interesting of these are the Forsyth Pass Trail, leading across the 9,000-foot gap just east of Clouds Rest, and the much-needed beginning of a trail down the north bank of the Tuolumne to the celebrated but almost inaccessible Waterwheel Falls.

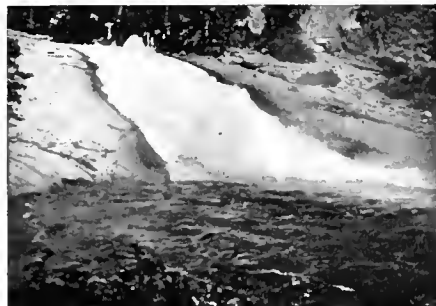


Above, Mt. Dana (13,050 ft.), seen from Gibbs. Below, Gibbs Mountain (12,700 ft.), from the Dana-Gibbs saddle.



The Forsyth Pass route, soon, let us hope, to be used by the new automobile road, offers a capital day's journey, horseback or

afoot, via the great falls of the Merced, and the lower end of Little Yosemite, to Tenaya Lake. En route, the wayfarer may enjoy one of the finest of the great tamarack pine forests that cover many of the Park's highlands, and study glacier history written plain at the top of Forsyth Pass. Here glacial scorings, and thickly strewn boulders that were plucked from uplifted sea-beaches back on the crest of the range and freighted hither to diversify this granite landscape, tell of former glacier levels, and remind us of the tremendous depth and mass of the ice-streams that were pushed down from Tenaya Lake and the Cathedral Peak plateau on the north and from all the Merced sources on the south. It is one of the sunniest and best-paying trail trips near the Valley, especially if, at the top of the pass, one turns off for the short ascent of another thousand feet to the summit of



"Apron" and Glacial Tarn or Lakelet, on the Merced at head of Little Yosemite.

Clouds Rest, and the broad panorama of snow-peaks which it unfolds.

The trail down the Tuolumne Cañon leads as yet only to the upper fall, but it commands a fair view of the whole series, and makes every one who travels down from Conness Creek and Glen Aulin rejoice that Superintendent Lewis finds himself able now to extend it to the main falls and on to Return Creek Cañon. Every mile of the way tells wonderful stories of the work of ice and stream in digging this colossal trench. We shall see much of it, and of the Waterwheels, in the next chapter. Another

much-needed trail extension is the promised completion of Harden Lake Trail down the huge south wall of Tuolumne Cañon and across the river to Pate Valley. This trail, when opened, will furnish one of the most remarkable



In Alpine California. Above, Mt. Dana Glacier, seen from the summit, with camera pointing sharply downward to the moraines and snow-covered ice cascades. Below, an arctic pool, not at the North Pole, but in Bloody Cañon.



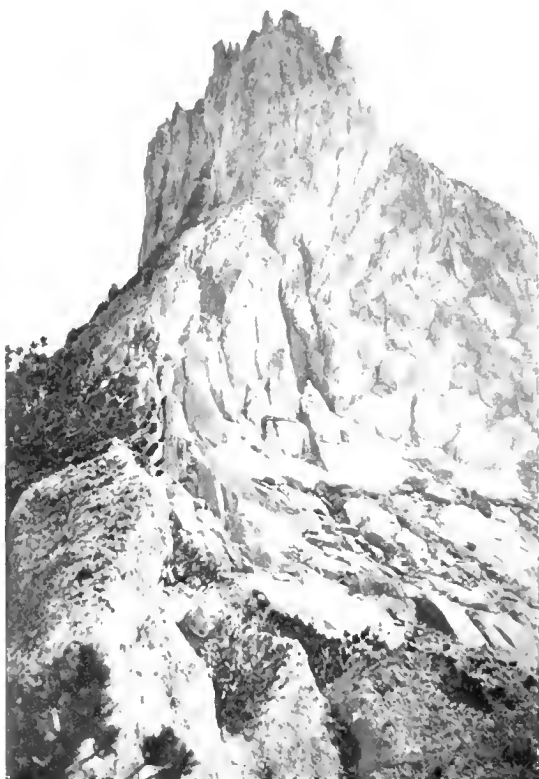
scenic trips in the Yosemite or any other National Park. Both these im-

provements, Mr. Lewis writes, will be made during the summer of 1921. The next step in trail development on the Tuolumne will be a trail from Return Creek Cañon, over the ridge above Muir Gorge (see p. 39), to Pate Valley.

Outing parties visiting the High Sierra may now leave Yosemite Village, where camp equipment and supplies, horses and guides are to be had, by one of several trails. The most popular are, first, those by Nevada Fall, Little Yosemite and Lakes Merced and Washburn in the Merced Cañon, continuing thence up to the headwater peaks, or diverging to the Illilouette basin or across one of the north-side passes to the Cathedral Peak uplands; second, the trails from Glacier Point south to the lakes north of Wawona, or east to the upper Illilouette country and the heights of the Merced Range; and, third, the Snow Creek and Yosemite Falls Trails to the Tioga Road, and thereby to Lake Tenaya and Tuolumne Meadows.



Summit of Mt. Lyeil (13,000 ft.). Made in the mountain spring (July), this picture shows the fine north-side glacier still too deeply covered with snow to disclose its characteristic crevasses.



Cockscornb Crest, most curious and striking of many pinnacled mountain masses dotting the alpine plateau east of Cathedral Peak. The spires crowning this crest and its neighbors, Unicorn, Echo, Columbia and the Cathedral itself (see p. 27), testify that they missed the ice-plane, and thus show the highest reach of the great Tuolumne Glacier.

The Merced route, besides attractive branch trails to Clouds Rest, Mt. Clark and their great outlooks, connects with other well-blazed trails crossing the Merced-Tuolumne divide via Sunrise Mountain or Tuolumne Pass; and also offers access to the entire upper watershed of the Merced. In this basin, the Merced's branches flow down from cirques and snowfields which form a great horseshoe stretching from the Merced Range and Triple Divide Peak, on the south, along the crest of the Sierra to the Cathedral Peak Range. Its principal peaks, reaching elevations of twelve and thirteen thousand feet, are Long, Foerster, Electra, Rodgers, Lyell, McClure, Florence, Parsons and Vogelsang,—a splendid line of snow-fountains, encircling a vast amphitheater laced with cañons and ridges, and everywhere decorated with great moraines left by the old Merced Glacier. In this wild region, Mr. Muir counted sixty-seven glacier lakes, not to mention scores of others in the Illilouette basin, and a multitude more on the south side of the Park,

in the watershed of the Merced's South Fork.

This whole section is a favorite haunt of sportsmen, since its lakes and streams are abundantly stocked with trout,—as, indeed, are the waters of the entire Park. Many thousands of young trout have been successfully planted in nearly every stream and larger lake, up to nine or ten thousand feet. As the region offers some of the toughest mountaineering, so nowhere in America is there better fishing.

Down in Yosemite Valley, the Merced shelters many an educated trout that exhibits only indifference to the lures of the fly-book. But back in the streams and lakes of the higher altitudes, as well as in the less fished



The "bergschrund" of Lyell Glacier. This German word ("mountain rift") is applied to the great crevasse stretching across the head of every active glacier at the point where its motion begins, and the ice-stream pulls away from the summit snowfield. To the weathering of the slope exposed in such crevasses, through daily thawing and freezing in summer, is chiefly due the head-wall cutting that digs the "cirque" or glacial head-basin far back into the heart of the mountain, and opens passes through the range. This is now recognized as the prime factor in the sculpturing of high mountain districts. The upper rim of a bergschrund often overhangs, as here, in a "snow-cornice,"

waters of Hetch Hetchy, during July and August, even a novice may fill his creel with glittering beauties. The native Rainbow trout (*Salmo irideus*) is widespread in the Sierra. The Eastern Brook trout (*Salvelinus fontinalis*), introduced here from the hatchery near Wawona, has multiplied extensively on the upper Merced, especially in Merced and Washburn Lakes, and also in the Tuolumne basin. A few Tahoe trout (*Salmo mykiss henshawi*) are also to be taken in the Merced, and an occasional Loch Levin, or hybrids of it with native species, rewards the angler. On the other hand, the wonderfully brilliant and



The Uplands in July. View of Echo Peak from Unicorn Peak, with Mt. Hoffman in the distance.

gamy Golden trout of high altitudes in the Mt. Whitney region is not found here. It is to be caught only in the lakes and streams of the southern Sierra, notably in the Cottonwood Lakes, where it is known scientifically as *Salmo aqua-bonita*, and in Volcanic Creek, *Salmo roosevelti*.

For those who mix mountain climbing with their fishing, or *vice versa*, the snow-peaks that sentinel the Merced amphitheater offer fascinating ascents; and the climber is rewarded with far-reaching views, both of that watershed and of the upper San



Summit of Conness Mountain (12,556 ft.). The cliff shown below is the top of a 2,000-foot wall, part of the rim of an ancient glacial cirque.



Joaquin. But the best mountain climbing in the Park is doubtless to be had from Tuolumne Meadows as a base. The way thither from the upper Merced, by either pass, is a day's easy march across high

country of broad, snowy cols and sunny, wind-swept plateaus, dotted with peaks of curious glacial architecture and shining granite bosses, all burished by the recent ice. It is country of immense interest, because it is astonishingly new,—so new, indeed, that the rapid disintegration common to altitudes of nine and ten thousand feet under daily interchange of sun and frost has not yet tarnished the landscape. Glacier-polished slopes and benches are common enough on the uplands adjacent to Yosemite and



Cathedral Peak Range, seen from the Tuolumne Meadows. View from junction of the Dana and Lyell Forks of Tuolumne River, showing Fairview Dome on extreme right, with Cathedral Peak beyond. Unicorn Peak is the high mountain on the left.



Returning from Ascent of Banner Peak.

northward past Mt. Hoffman and Fairview Dome. This is the region traversed by the south branch of the Tuolumne glacier, on its way to Tenaya Cañon and Yosemite. The cleanness of the country is amazing, and we realize how the mighty ice-stream stripped the whole region bare of its overlying sedimentary rock, and left only the hardest granites (See pp. 29, 49).

The trails radiating from Tuolumne Meadows bring a score of im-

Hetch Hetchy. Here, on the edge of the snowfields, they are everywhere; but thousands, perhaps hundreds of thousands, of years younger. How hard it is to take Nature's word for it, that this land of sunshine and gentlest mountain airs, with joyous flowers in every hollow that holds a spoonful of soil, was yesterday a sea of sullen ice!

Yosemite visitors who have the time will find a trip to Soda Springs from the Merced, across one of the high passes, as fine an experience as the Park can give. But the Tuolumne may be reached more directly from the Valley, either by the Yosemite Point trail or by the Snow-Creek trail out of Tenaya Cañon. Each of these trails soon brings one to the Tioga Road, which he follows to Tenaya Lake, and thence



The Craters of Mono County. This unique volcanic range, which lies in the desert of Eastern California, below Mono Pass, rises 2,500 feet above the near-by Mono Lake. The picture is a winter view from Pumice Valley.

portant peaks, with their glaciers and snowfields, within easy reach of the climber. The story of actual ascents must be left to our illustrations showing some of the adventures of California's great Sierra Club.

Of all high mountain scenes which reward such strenuous sport, the glacial head-basins are the most interesting. For they hold the secret of the glacier's method. The fundamental importance of such cirques as makers of mountain landscape was not recognized, even by leading geologists, till a decade or two ago. Much less was it understood that the tool



Matterhorn Cañon, seen from its east slope. Matterhorn Peak (12,272 ft.), is on the skyline at right, and the Saw-Tooth Range in the distance on left of center. This slope bears one of the noblest forests of beautiful alpine hemlocks to be found in the Park.

with which that work is done is the "bergschrund," or crevasse across the head of every living glacier, separating the moving ice from the snowfield above (See page 129). That the bergschrund, through its exposure of the head-wall to daily thawing and drenching, and to nightly freezing, plucks huge rocks from the mountain, and so drives the cirque deeper and farther back, till great peaks are undermined and overthrown, and broad passes are cut where two glaciers head together,—this world-old romance of the silent, icy heights is one of the newest nature-stories told by twentieth-century science. So little were these things known a few years ago, indeed, that the famous Scotch geologist, Professor Geikie, could describe the "corries" or cirques of the Scotch Highlands as mainly excavated by "convergent torrents," dropping over their rims! But if Geikie's theory begged the question, it remained for our distinguished American scientist, Dr. Gannett, president of the National Geographic Society, writing as late as 1898, to ascribe the cirque to the avalanches which its steep walls induce.



A Typical Glacial Cirque on Kuna Crest. Such a horseshoe-shaped head-basin is dug by each glacier, using the bergschrund as a tool.

Neither Scot nor American visualized his mountain as it was before the glaciers had clawed into its heart. Said Gannett:

Glaciers commonly head in amphitheatres or cirques—basins lying under the shadow of the summit cliffs. An amphitheater is surrounded on three sides by vertical walls or steep slopes, down which the ice and snow slide in avalanches. The effect is precisely like that of a waterfall. The falling snow and ice dig a hollow or depression at the foot of the steep descent, just as water does. Such amphitheatres are found at the heads of all glacial gorges in the high mountains.—*National Geographic Magazine*, vol. 9, p. 419.

Dr. Gannett assumed the existence of the "vertical walls" and "steep descent"—the very things his theory professed to account for! But field work by those indefatigable glacier-trailers, Johnson and Matthes, discovered the real cause. It was the bergschrund that dug

the cirques and modeled the peaks of this new land of the West, just as, in older time, it helped to level the once lofty ranges of the East.

California's mountains crown all her diversified wealth of scenery and climate. The story of her old glaciers is as fascinating as the new life of tree and flower which they have made possible. Under the gentle and unfailing sunshine of the highlands, on one of their broadest alpine meadows, those dauntless explorers, the members of the Sierra Club, led by John Muir, America's greatest mountaineer and long their president, discovered the Fountain of Youth, and proved it no fable but a fact of the



Piute Mountain, and Lakelet near the head of Seavey Pass.

Yosemite Sierra. Here, at Soda Springs on the Tuolumne, they have established their upland headquarters, Parsons Lodge, a memorial to another beloved member, and from this base in alternate summers they explore all the neighboring heights. But for Muir no building is a fit memorial. He is commemorated truly in the stark granite trail which bears his name, leading south from the Yosemite country to the alps of the southern Sierra.

And what a leader was Muir! As one reads his books or recalls inspiring talks with him, George Sterling's lines on another great Californian come to mind:

Of all he said, I best recall:
 "He knows the sky who knows the sod;
 And he who loves a flower loves God."
 Sky, flower and sod, he loved them all.

The Sierrans testify their love of the mountains by spending a month each summer among them. This is the sanest and most joyous of sport. It was my privilege a few years ago

to join the club's large party at their camp in Tuolumne Meadows, and there learn how two hundred and fifty men and women, drawn from all the professions, lawyers, teachers and business men, students, doctors, preachers, were able, after a day's climbing, to gather about a huge campfire, and jest away their weariness in club songs:

There are rocks in the cradle where
 I sleep,
 And roots and cones embedded
 deep;
 Aslant I lie upon my bed,
 My feet are higher than my head.
 I know I shall not hear the "call"—
 My camp is farthest off of all;
 And so I dare not go to sleep,
 While ants and lizards o'er me
 creep.

Ah! those mountain fire-
 sides, after the long marches



Group of 250-foot Sequoias, showing characteristic dome shape of crown when unbroken. The sharp-pointed trees at sides are White Firs (*Abies concolor*).



Nearing the Summit of Mt. Lyell.



View East from Benson Pass (10,130 ft.). In the foreground, Wilson Creek Cañon leads down to the Matterhorn Cañon. Eight miles east, Conness Mountain rises at center of the sky-line.

over the snow-fields, or across the passes, or down the cañons! We were not always frivolous. One evening, a brilliant college philosopher put into crisp English Plato's legacy to modern life. Again, a returned diplomat outlined America's relations with the Orient, and a well-known Hebrew

scholar, turning from philology, very delightfully described the birds of Yosemite. Another night, a distinguished scientist from California's great university explained how he told the years of a trout. "We estimate the age of a tree," said the solemn professor, "by its growth rings. We estimate the age of a horse by its teeth. We estimate the age of a woman by counting ten, and then asking. We estimate the age of a fish by noting the circles in its ear-bones." No wonder those "serious" campfires drew crowds of tired trampers!

This inspiring society is one of the most useful of California organizations. We marvel that the East goes to Europe to see mountains. This will be true until we make our own more lovable mountain districts as accessible as are the Alps, and as well known. The Sierra Club is hard at work on these tasks.



Snow Plant (*Sarcodes sanguinea*).—The most brilliant decoration of the Yellow Pine belt, where its scaly stems and fleshy blood-red flowers, closely follow the retreat of the snow.



Sierra Club Luncheon on Lee Side of Lyell Summit. View across Lyell Fork to range dividing the Merced and San Joaquin.



Muir Trail, California's memorial to her greatest mountaineer and naturalist, the late John Muir, who first discovered living glaciers in the Sierra Nevada, and established the glacial origin of Yosemite and Hetch Hetchy Valleys. This alpine trail, when completed, will furnish a high-line route joining Yosemite with the heights of the Kings and Kern Rivers and Mt. Whitney. The typical bench lake seen in this picture is Heart Lake, on the South Fork of the San Joaquin.



Looking South from Top of Mt. Lyell (13,690 ft.). Below lies the cañon of Lyell Fork of the Merced, rimmed eastward by the Rodgers-Electra Range, part of the Yosemite Park boundary. This range stretches south, and finally is seen bending west and embracing the vast "fan" of the Merced's head-streams. East from Rodgers Peak, our view shows a flanking ridge which leads to Banner Peak and Mt. Ritter, and walls the basin of the North Fork of San Joaquin River. Ritter at 13,176 ft. tops the sky-line in this part of the Sierra. Its wild region of peaks, cañons and alpine lakes, once part of the Yosemite Park, and valued now only for its scenery, should be returned to the Park limits.



Waterfalls and Cascades in the Tuolumne Grand Cañon. This great cañon, as well as that of the Merced, was dug by a glacier built of snows collected by the High Sierra summits. Hence the two illustrations above show cause and effect.



Upper Hetch Hetchy, viewed from Rancheria Trail on north side of Le Conte Point. North Dome is seen on the right, Kolana Rock in center, and Smith Peak on the left, 4,200 feet above the floor of the Valley.

IV.

TUOLUMNE GRAND CAÑON AND HETCH HETCHY

I see an eagle sweep
 Athwart the blue; a gleaming river bind
 In gorgeous braid the valley's golden gown;
 A cataract plunge o'er its distant steep,
 And flutter like a ribbon in the wind.

—Herbert Bushford.

THE Sierra Club discovered the Fountain of Youth, which men have sought for centuries; and having taken possession of it, now plans to guard the treasure well, sharing it, however, with all who may come to drink its sparkling waters and breathe its mountain air. In the homelier language of to-day, this coveted fountain is the "Soda Springs" on the north rim of Tuolumne Meadows, a dozen miles by Tioga Road from Tenaya Lake, and twice as far from Yosemite Village.

No finer spot could be found for a mountaineers' rendezvous in the High Sierra. The great valley known as Tuolumne Meadows—a filled-up lake basin at the junction of the Dana and Lyell Forks of the Tuolumne River—is about ten miles long and two in width. On all its sides, the highest mountains of the central Sierra stand guard. Conness, Dana, Mammoth and Lyell peaks are upon the north and east. The unique Cathedral Range overlooks it immediately on the south. Lambert Dome rises from its floor, and, still more beautiful, Fairview Dome towers over its lower end, where the river, leaving its quiet meadow reaches, plunges down the vast Tuolumne cañon on its boisterous way to Hetch Hetchy.

Upon this capital site, the club some years ago bought the old Lambert, or Lembert, homestead, a quarter-section in the heart of the Meadows,



Lower End of Tuolumne Meadows, with Cathedral Peak on the sky-line. The Tioga Road skirts the south side of the Valley, which is also reached by many trails, making it the most accessible point in the northeastern part of the Park, while the important mountains surrounding it make it a favorite starting point for exploration. In the center of this picture is seen the Soda Springs tract of the Sierra Club, 160 acres, including the Springs themselves, at the edge of the wooded moraine north of the river bend. The Club has erected a lodge here. This view is from the summit of Lambert Dome.

which was preempted by John Baptist Lambert, a stockman, in 1885, before the creation of the National Park. The tract embraces several fine mineral springs, and with one exception is the only private holding in the eastern section of the Park. The land is part meadow and part hillside



The White Cascade, in Tuolumne River at Conness Creek Basin. All of the Tuolumne's ancient cataracts have cut through their glacier steps and become cascades. Many of these, like the one in view, are of great height and splendor.

facing the mountains on the south. Its central location, with the Tioga road running south and east, and trails radiating to all parts of the Tuolumne watershed, makes it the natural starting point, either for mountain climbing, or for exploration of Tuolumne Cañon and the alluring region north of it. From it one goes with equal direct-

ness across the passes to Mono Lake or west to Hetch Hetchy.

Many times in its history, at intervals of a few years, the Club has found Tuolumne Meadows a convenient and delightful base for summer explorations; and here, on the one hundred and sixty acres which good fortune enabled it to acquire, it has now erected its High Sierra headquarters. This structure, admirably planned to fit into the upland scene, and built of rough stones from the moraine on which it stands, is named "Parsons Memorial Lodge," in honor of the late Edward T. Parsons, long a director of the society, and one of its most active mountaineers. With an established mountain home, the Club returns more frequently than ever to the Meadows as a climbing center, and, save for its trips into the Southern Sierra, is likely to find hereabout enough climbing of varying difficulty, to occupy most of its members on most of its summer expeditions for years to come.

It is only a day's good walk from Soda Springs to the summit of Mt. Dana and back. The Tioga Road and Dana Fork are followed to the foot of the mountain, whence the trail climbs the pass between Dana and Gibbs. The ascent from the saddle is short and easy. The summit of Dana commands a view of more snow-peaks, probably, than one can see with so little labor anywhere else on the continent, while a mile down on the east side lie Mono Lake, rimmed with fine mountains, and, south of it, a gray and grim line of volcanic peaks.

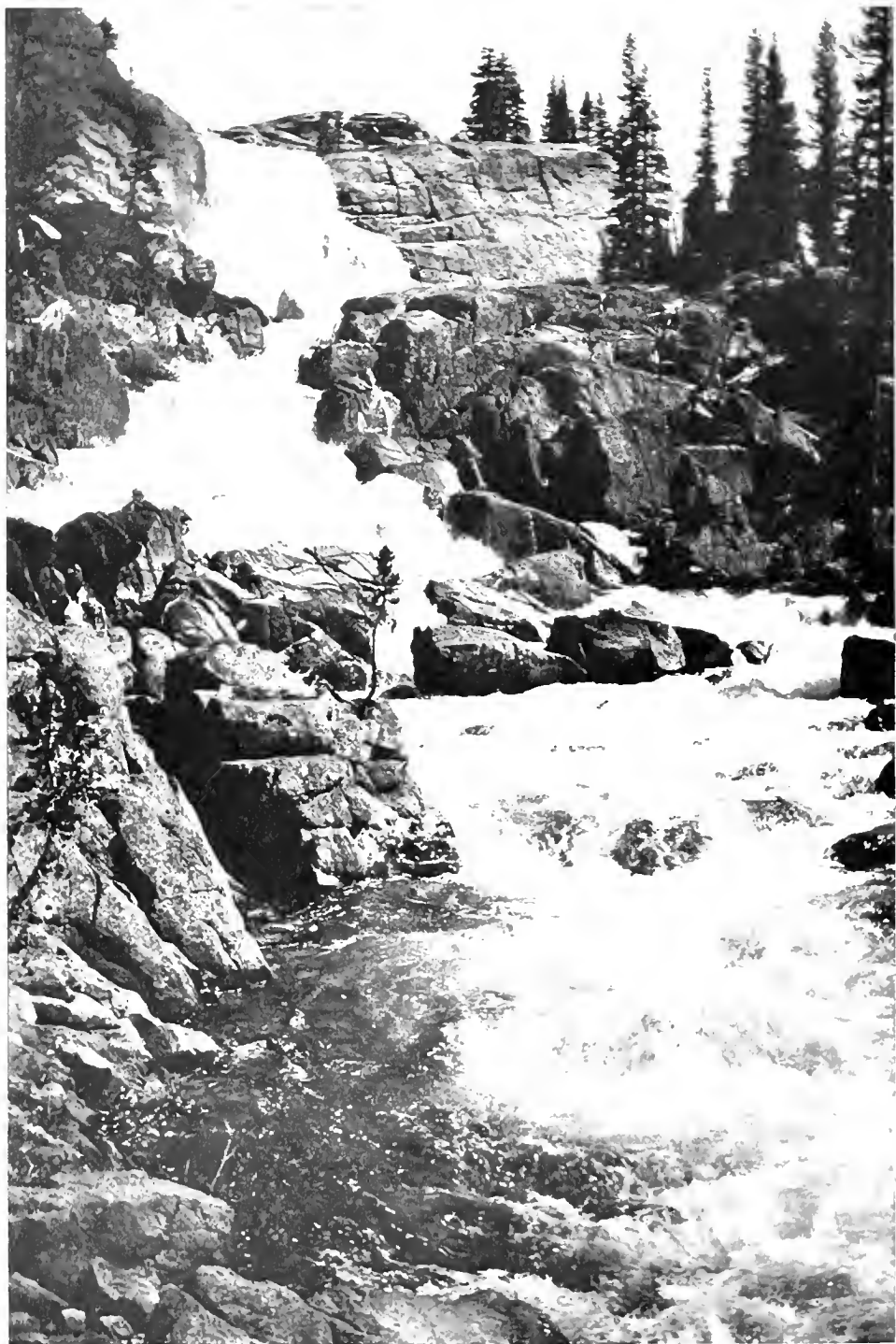
From the Dana-Gibbs saddle one July day,—the only stormy day of that Sierra Club outing,—I beheld a scene not soon to be forgotten. In Tuolumne Meadows, westward, it was raining lightly; but below us, on the east, a wild thunderstorm swept the Mono Lake basin with lightning and rain. All the great amphitheater seemed filled



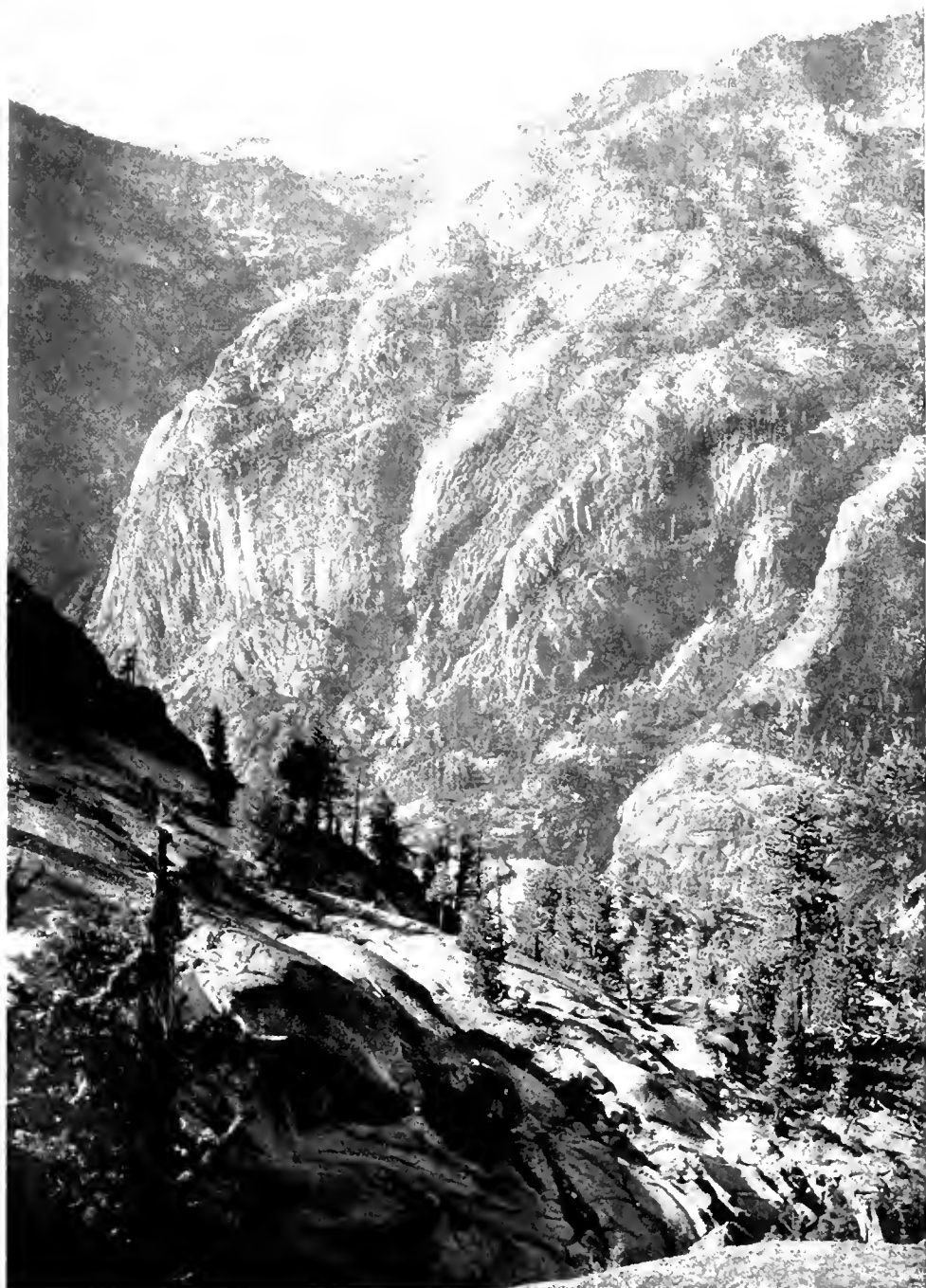
Glen Aulin and Wildcat Point, near the upper end of Tuolumne Grand Cañon.



Cookstoves on the march. Part of the Sierra Club's commissary in motion.



Tuolumne Falls, at the Head of the Grand Cañon of the Tuolumne;—first and most important of the cascades by which this nobly turbulent river, dropping 5,000 feet in twenty-five miles, comes to the quiet waters and wild gardens of Hetch Hetchy.



Grand Cañon of the Tuolumne, seen from its north wall, looking across to the deeply eroded side of Falls Ridge. This vast cutting by glacier and stream extends from Tuolumne Meadows to Hetch Hetchy, twenty-five miles in length and from 3,000 feet to a mile in depth.



Le Conte Falls, on the Tuolumne above the Waterwheels.

with the black, solid mass of the tempest; but as flash upon flash pierced the darkness, we saw, vivid as day, the breakers beating the shore of the lake, and the trees upon the islands that dot its breast. While this storm blackened the Mono basin at our feet, beyond

stretching far into Nevada, range after range rolled away, waves of a sea of mountains, flashing in the same sunshine that bathed our lofty outlook.

Other peaks are reached from the Tuolumne base with almost equal ease. The trail to Mt. Lyell and its neighbors follows up Lyell Fork, and unfolds a succession of splendid mountain pictures. In other directions, trails lead north to Conness Mountain, remarkable for the sheer walls of great glacial head-basins, and to beautiful Matterhorn Cañon and the Benson Pass country. Those who like still harder climbing may go with the Tuolumne down the whole length of its rough cañon to Hetch Hetchy. The Sierra Club parties commonly divide, part taking the trail across the uplands, the rest choosing the pathless river gorge. The former route offers the inspiration of wide views from the heights; the latter, the zest of a long scramble across huge boulders and polished benches, around frequent cascades, and over the walls of such impassable box-cañons as Muir Gorge. The cañon of the Tuolumne is one of the deepest and wildest glacier-troughs in the world. Its walls rise to heights of a mile above the mad river, with constantly changing interest in their sculpture.

The waterfalls of the Tuolumne are nowhere comparable in altitude with Vernal or Nevada Falls; almost invariably the erosion of their granite glacier-steps has converted them from straight cataracts into broken, gliding cascades; but they have the fascination of infinite variety and the impressive power of repetition, while



Cathedral Creek Falls, the fine cascade by which Cathedral Creek drops into Tuolumne Cañon.

their setting, at the bottom of this truly grand cañon, is far more stupendous and wonderful than that of the great Merced cataracts. For twenty-five miles of cascades, rapids, sheer falls of lesser drop, and delightful glacial tarns, the wild river plunges down a path so narrow and difficult that to follow it two or three miles is sometimes a day's work for a party of experienced climbers. Even these climb over and around Muir Gorge, rather than risk their lives in its deep flume.



California Falls and Upper Waterwheels.

Camping at Conness Creek basin, below the splendid Tuolumne Falls, and at the foot of the noble White Cascade, most of the Sierra Club party, one July before the present trail was made, went down the cañon as far as the Waterwheel Falls. It was a surprising and I dare say almost unique scene that rewarded the hard tramp over rough earthquake talus and through the dense chaparral. These veritable "waterwheels" are found where the turbulent river, shooting down smooth inclines at furious speed, drops into spoon-shaped depressions caused by the erosion of soft rock. The water is hurled aloft, twenty to forty feet at different stages of the stream, and the backward action of the spray gives a good imitation of a wheel revolving with great velocity.



Mountain Hemlocks (*Tsuga mertensiana*) on east slope of Matterhorn Cañon, where there is a remarkable forest of this most graceful of alpine trees.

Returning to Conness Creek, we took the high trail, a day or two later, up the fine Cold Creek Meadows, and across Virginia Cañon, thence climbing an unnamed pass to reach Miller Lake, and late in the afternoon descended through a noteworthy forest of the beautiful mountain hemlocks



Largest of the "Waterwheels," Tuolumne Cañon.

to our night's camp in Matterhorn Cañon. Matterhorn Peak and the cañon are worth seeing, but the next day, after we had climbed the long trough of Wilson Creek to Benson Pass, and then ascended the hills overlooking the pass at an elevation of about 10,500 feet, a wonderful array of mountains, cañons, valleys and lakes swept majestically from Conness on the east around the circle to Rancheria Mountain and the blue deeps of Tuolumne Cañon in the southwest. Everywhere the vast amphitheater told of its ancient inhabitants, the glaciers, now long vanished, but proclaimed in the clean-cut cirques, deep-set glacial lakes, and silvery waterfalls dropping from hanging valleys high on distant cañon rims.

Descending from Benson Pass, the trail wound round Volunteer Peak, past Smedberg Lake, and in the sunny afternoon brought us to camp on



Coasting on the Polished Granite, at the Waterwheels.

Rodgers Lake, the queen of all lakes on the north side of the Park. Leaving this camp the next morning, abandoning the delightful lake shore was a hard parting. But the day brought new wonders in the great views it gave us of Tuolumne Cañon, as the trail skirted its north wall. Camp at night at Pleasant Valley



Waterwheel Falls, in the Tuolumne Grand Cañon. Here the river, shooting down a smooth granitic flume, strikes several bowl-shaped depressions formed by the erosion of comparatively soft spots in the rock, and is hurled far aloft, thirty to forty feet at high water, in the remarkable "wheels" shown above.

in Piute Cañon was followed by the long ascent of Rancheria Mountain, the next day, through forests of red fir (*Abies magnifica*) that were a joy to see. These stately trees justify Chase's enthusiasm: "If I were called upon to choose the one among the conifers that I would live and die by, I should choose the red silver fir, with no fear of ever wearying of its sublime companionship."

Reaching camp on Rancheria early in the afternoon, we had more glimpses down into the Tuolumne abyss, and still more the following morn-



Sunset on Smedberg Lake, one of the sources of Piute Creek, north of the Tuolumne.

ing, when the trail led us westward to Rancheria Creek. The descent into its cañon brought us to its charming falls, and finally to the Mecca of our pilgrimage, lovely, famous, changing Hetch Hetchy.

This book is not a brief for or against the San Francisco power and water dam. Enough has already been said on both sides of that controversy that were better left unsaid; and although I am heartily with those who oppose the commercializing of any of our too few national parks, I recognize that many conservative and disinterested Californians, both in and out of San Francisco, hold that the conversion of Hetch Hetchy to the city's use was necessary, and that it need not close the Tuolumne watershed, or preclude the establishment of sanitary camps and hotels for visitors who may wish to explore the Tuolumne highlands. The issue was fought in good faith, and to a finish. Congress acted sincerely in the belief that



Rodgers Lake. View looking down from the trail to Benson Pass. This fine alpine lake is a favorite camping spot of the Sierra Club and other parties exploring the north side of the Park.

the necessities of this case transcended the danger of a possibly troublesome precedent. Its action, confirmed by court decisions and commercial settlements, has closed the controversy so far as the public is concerned. It remains for me only to point out that Hetch Hetchy is soon to become one of America's finest lakes, and that, in the change from a glorious mountain Valley to a unique mountain lake, some far-reaching public benefits will result.

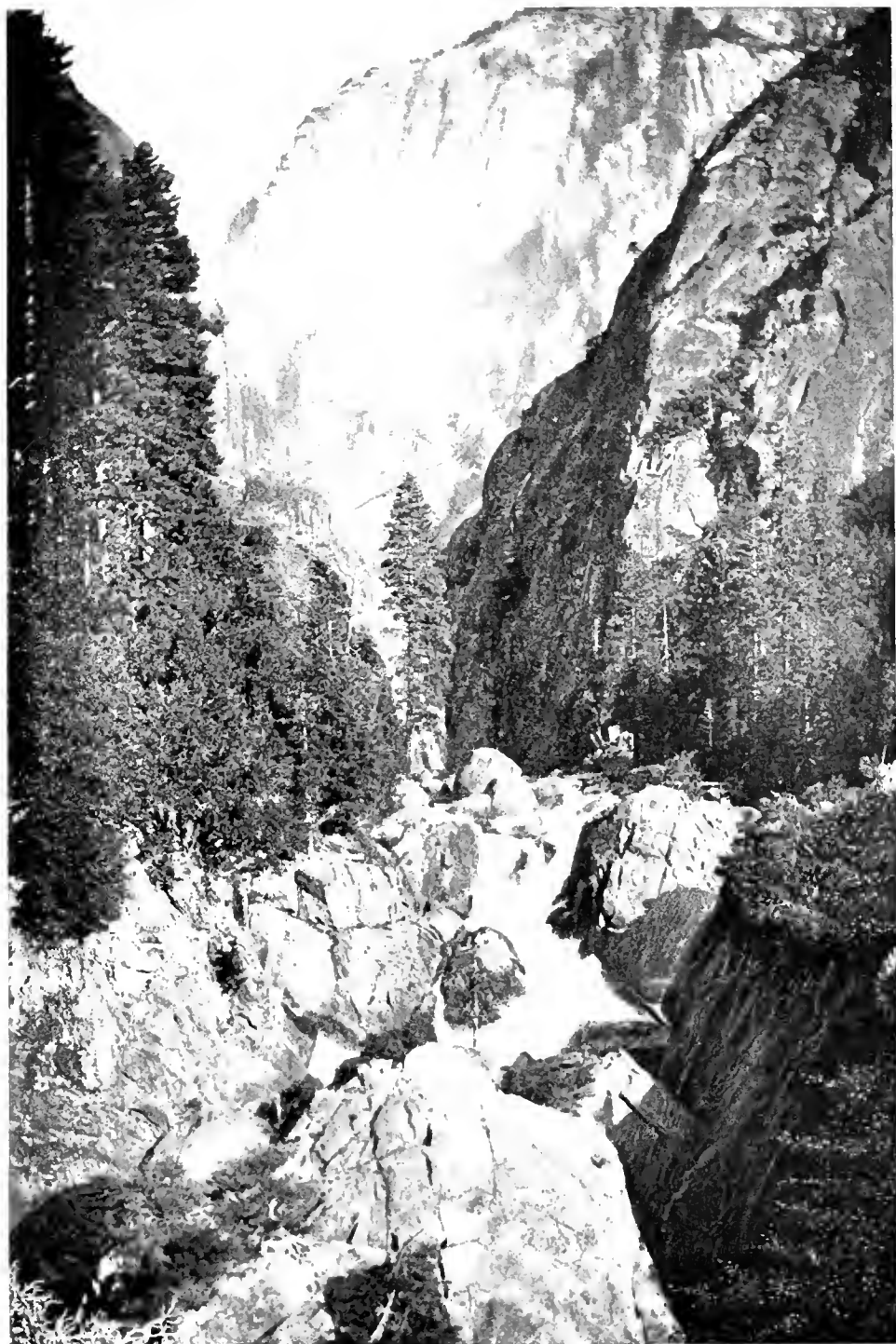
If there were no Yosemite, Hetch Hetchy would doubtless be the most celebrated Valley in America. But it is mislead-



In the Heart of the Tuolumne Grand Cañon. Above, the Tuolumne is seen near its junction with Cathedral Creek. The lower view shows the entrance to Muir Gorge. Here the river contracts to a race-like stream, gripped between the sheer walls of a box cañon, which is impassable save at lowest water. Few have ever made the trip.

ing, though easy, to describe it as merely a minor edition of the

more magnificent cañon. The resemblances, of course, are startling. Sheer gray walls of granite, marked with "royal arches," crowned with domes, and hung with splendid waterfalls, rim a similar level valley floor. This records the filling of an ancient glacial lake, which is still more plainly recalled in the high rock sill at its lower end (See page 154). Here the Tuolumne, after flowing lazily for three miles amidst meadows and the charming forests which have now been felled by the engineers, cut a narrow



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Muir Gorge. View from its lower end, looking up the Tuolumne.



Little Hetch Hetchy, a mile above the main Valley; Kolana Rock in the distance.

box-cañon, where now the San Francisco dam is building. Slowly passing this bar, the stream at once resumed its role as a cañon torrent, and bounded wildly away to join the distant San Joaquin. Thus the Valley duplicated the glacial story of Yosemite.

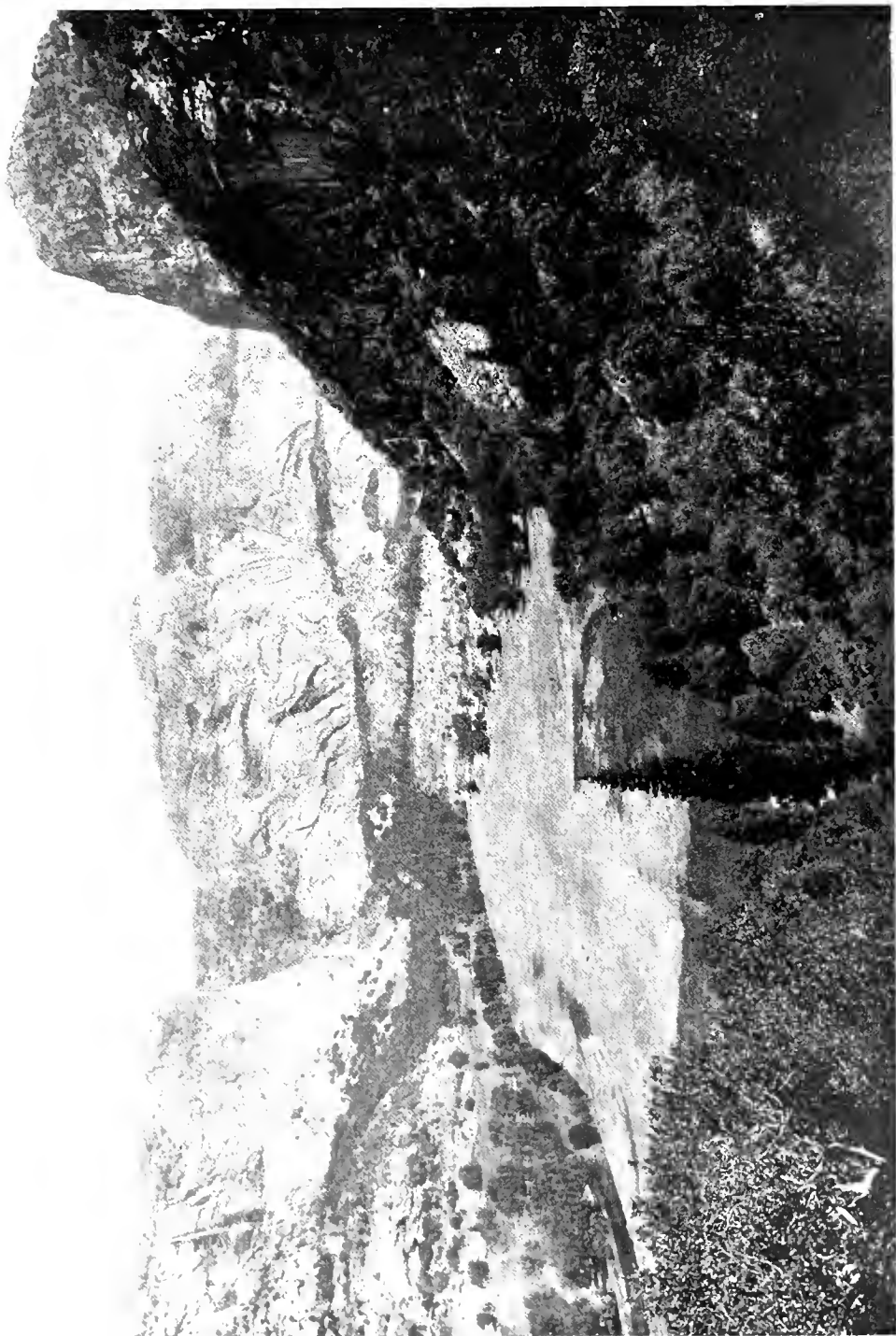
But Hetch Hetchy had, and has, a character and atmosphere all its own. Three hundred feet lower in altitude than Yosemite, it is only half as long and wide, with walls two-thirds as high. The smaller cañon is warmer, sunnier, more gracious. Its beauty is less appalling, and while the forests remained, its charm was so much more intimate that save for the formal resemblance and contiguity of the two Valleys, a reader of mountain character might never think to compare the gentler graces of Hetch Hetchy with the stupendous and

startling grandeurs of the more famous cañon on the Merced.

The walls of Hetch Hetchy, imposing in their height and sculptured forms, will make a very notable frame for the restored lake. Its two great waterfalls, with the fine cascades in the branch cañons of Rancheria and Till-Till Creeks, so far as not buried by the 300-foot lake level, will always be among the most beautiful in the Park. But the Valley floor, with all its splendor of mountain flowers and stately forests, is gone forever. Utility apart, and as a matter of beauty, no lake can ever take its place, or make up the loss of such groves of pines and oaks. Black oaks dominated here, just as the yellow pines are supreme on the floor of Yosemite. Taller than the live oaks,



Weighing the Dinnage. This ceremony precedes each day's march on a Sierra Club outing.



Central Hetch Hetchy. The Yosemite of the Tuolumne. View from Surprise Point on the south trail. At the middle of the south wall (right), Kolana Rock rises approximately 2,000 feet. Opposite are two fine waterfalls, Tuleculla and Wapama (the former dry in late summer), with the Hetch Hetchy El Capitan (1,300 ft.) between them. Beyond is North Dome (2,400 ft.). The likeness of this famous but little known canon to the still grander Yosemite of the Merced is seen in its precipitous walls, with their cataracts, "royal arches" and domes, and in its level floor, recalling the ancient lake which is soon to be restored to its imperial setting.



Sunrise in Hetch Hetchy

with vast crowns of bright deciduous foliage, they formed here the noblest oak groves I have ever seen; and many a lover of friendly trees who happily knew Hetch Hetchy Valley will be haunted by their ghosts as his automobile speeds him past the level waters of Hetch Hetchy Lake.

But those sentiments are no longer relevant. For the future of Hetch Hetchy is now inextricably linked with that of San Francisco and its neighbor towns of the Bay District. It has become the guarantor of health and prosperity to a community already passing a million of population.

California began as a mountain commonwealth, washing its first riches from river gravels with water from the Tuolumne, Merced and scores of other streams. These streams yield less gold dust to-day, but greater wealth. Water itself is now the chief gold of California—water for healthful living, for irrigation, manufactures, power.

When Congress, acting disinterestedly for what it deemed the good of California, authorized San Francisco to impound the flood waters wasting from 650 square miles in the Tuolumne, Lake Eleanor and Cherry Creek watersheds, it endowed the city with perpetual wealth beyond all the Tuolumne country had yielded to its goldseekers.

New York City is spending \$162,000,000 to add 500,000,000 gallons a day to its water supply without getting a single candle-power of electric energy. Los Angeles, for \$30,000,000, has providently made sure of 260,000,000 gallons per diem from Owens river, and expects an electrical development of 49,000 horse-power. Changes in the prices of labor and materials since San Francisco voted



A Notable but Unnamed Lake in Eleanor Cañon above Lake Eleanor.

its \$45,000,000 of 4½ per cent bonds in 1910 may increase the cost of the Hetch Hetchy-Lake Eleanor project by fifty per cent. Even so, San Francisco's investment will be the best of the three. For the engineers have calculated that it will not only add 400,000,000 gallons daily to the city's present water supply—a generous per capita allowance of 100 gallons a



Hetchy Hetchy Gorge. Here is seen the rock sill telling of the Valley's history as a filled-up glacial lake. In this gullet, twenty yards wide, the San Francisco engineers, under authority of Congress, are building a 300-foot dam, which will create a lake seven miles long, impounding 112,000,000,000 gallons of the Tuolumne's snow waters, now wasted in spring floods. This will add 400,000,000 gallons daily to the water supply of the San Francisco Bay District. In bringing it to sea-level, an electric development ultimately totaling 200,000 horse-power is promised.

day for a future metropolitan district of 4,000,000 inhabitants—but will develop 250,000 horse-power of hydro-electric current.

In a word, the return from the city's outlay should, after redeeming the bonds, greatly reduce taxes, while providing water and power at low prices for the entire municipal, industrial and domestic needs of the Bay section for generations to come.

Any account of the wider Yosemite that is fast coming into public use must make note of the opening of San Francisco's Hetch Hetchy railroad, sixty-eight miles along the Tuolumne. This for the first time furnishes direct access to Hetch Hetchy Valley, and a base for exploring the wild mountain and lake region north and east of it, stretching from the Lake Eleanor headwaters to Tuolumne Grand Cañon. Many visitors may be expected to enter the Park by this railway, visiting Hetch Hetchy,



Lake Eleanor, five miles northwest of Hetch Hetchy. This beautiful mountain-walled lake, enlarged by a dam at its outlet, is now a part of the San Francisco water system.

and thence journeying across the hills by auto-stage from Mather Station, via the Tuolumne Big Tree Grove, to Yosemite Valley. The trip is full of scenic and historical interest. For the lower Tuolumne Cañon is all "Bret Harte country"; the "bars" and "flats" along the river still bear the names given them by the old Argonauts who worked them for their "dust," and Groveland furnished the original of "Tennessee's Partner."



Five-Finger Falls, in Rancheria Creek, Hetch Hetchy.

Next to the Hetch Hetchy Railroad, the most important step in opening the Tuolumne below Soda Springs for visitors is the new trail now to be completed from Harden Lake to Pate Valley. It will be one of the most popular trails in the Park, leading down to the very heart of the Tuolumne Grand Cañon.



Upper Hetch Hetchy, seen from the bench of the north wall. The foreground shows the Valley at its least width, and before its noteworthy forest of splendid black oaks and yellow pines had been cut, in preparation for the San Francisco dam. Its elevation above sea-level is 3,600 feet. On the left, beyond the foot of North Dome, it widens to meet the cañons of Till Tilt and Rancheria Creeks; Rancheria Mountain forms the distant sky-line. Hetch Hetchy ends where Le Conte Point, the conical mountain in the middle distance, cuts off Little Hetch Hetchy beyond, crowding the Tuolumne River against the foot of Smith Peak, the long slope of which rises east of Kolman Rock on the right.



The "McKinley," one of the massively modeled Big Trees in the Mariposa Grove. This Giant Sequoia is credited officially with a circumference of seventy feet at the ground, and a diameter of 22.3 feet. At ten feet up, these dimensions are a third less; but above its bulging base the Sequoia's columnar bole tapers slowly up to its compact crown.



Cavalrymen at the Cabin in Mariposa Grove. For many years the National Park was policed by a detail of United States cavalry, and its Superintendent was an Army officer. This system, however, was changed by the last Federal administration to one of civilian supervision.

V.

KINGS OF THE FOREST

Poems are made by fools like me,
But only God can make a tree.

—Joyce Kilmer: "Trees."

In terraced emerald they stand
Against the sky,
Each elder tree a king
Whose fame the wordless billows magnify.

—George Sterling: "An Altar of the West."

THE crowning glory of the Yosemite country is its forests. Everywhere below timber-line, these holdly make themselves a factor in the mountain scene, and always they render to it an invaluable service, both of beauty and of utility. On the farthest ridges, they climb to inaccessible heights, and up to the very limits of plant life are found struggling to conceal the glacial scars, soften the bleakness of moraine and cañon, and decorate the barest granite benches with tough, adventurous pines and junipers. Covering valley and mountain-side alike with their protecting coat of rich green verdure, they shelter the snows and maintain the mountain springs. Thus, both directly and indirectly, they work incessantly to beautify the High Sierra, while, by preserving the head-fountains of river supply, they make possible the agriculture of the lands below.

The Yosemite forests are mainly composed of only a few great species. Commercially, they are almost wholly made up of conifers, the



Sugar Pine (*Pinus lambertiana*), loaded with cones. This tree, king of all the pines, is noted for its fine cones, twelve to twenty inches long.

oaks, maples and other hardwood trees occupying a wholly secondary place in the vast army of tree life. Foremost among the cone-bearers in extent and commercial importance stand the pines, with the grand Sugar Pine (*Pinus lambertiana*), noblest of all the tribe, and its ubiquitous rival, Western Yellow Pine (*Pinus ponderosa*), and the latter's hardy first-cousin, Jeffrey Pine (*Pinus jeffreyi*), far in the lead. Extending the broad province of the pines upwards into the subalpine belt, and often far towards timber-line, the Lodgepole Pine (*Pinus contorta*), here commonly called Tamarack, undertakes the homely office of covering the wildest moraines and windiest ridges with forest life and something of forest charm. Two of the great family of the firs range

from the upper edge of the Yellow Pine belt to the middle Tamarack zone. These are the White Fir (*Abies concolor*) and Red or "Silver" Fir (*Abies*



The "Fallen Monarch," with troop of cavalry. This great Sequoia, when standing, was one of the largest in the Mariposa Grove.



A Typical Sierran Forest of White Firs (right) and Sugar Pines (left). In the Main Timber Belt, the "White Fir" gets this colloquial name from its bark, which on young trees is silvery white, but on adults breaks into thick, corky ridges, ashy-gray in color. The Sugar Pine is recognizable by the narrow ridges of its carmine-brown, flaky bark. Note the comparative absence of undergrowth in the sunny Yosemite woodlands.



A Thick Stand of Jeffrey and Young Yellow Pine. The adult trees in foreground are Jeffrey Pines, easily known by the deep fissuring and irregular ridges of their dark red-brown bark, and its ridges irregularly connected, contrasting with the broad, shield-like plates in the russet-red bark of mature Yellow Pines (See pp. 52 and 163). This interesting picture illustrates the open character of the Sierran forest, where one may often wander at will, with a compass for his only guide.

magnifica), both of them splendid members of the clan. Less numerous than these, but still a familiar inhabitant of fertile valleys and watered ridges, in the lower third of Yosemite Park, is the Incense Cedar (*Libocedrus decurrens*), always an interesting and beautiful tree, with bark and foliage, and often with a crown, suggesting somewhat distant kinship with the greatest of all conifers, the Sequoia.



Spermophiles at Conness Creek.

The Yosemite National Park contains three groves of *Sequoia gigantea*, which botanists now agree in calling, with specific reference to its pre-eminence among the world's silva, "Big Tree." These groves

naturally form the climax of the Yosemite forests, as the tree itself represents the climax of all plant life. Two of them, the Merced and Tuolumne Groves, on the west border of the Park, contain from thirty to forty mature trees each, some of them magnificent representatives of their kind. But the Mariposa Grove, on the south side of the Park, and reached via Wawona, is one of the largest and most important areas of Sequoias which are found in the central Sierra, and are termed "groves" by way of distinguishing them from the vast Sequoia "forests" of the southern slopes of the range.

The Yosemite forest, of course, forms a mere fraction in the great blanket of tree life which clothes the western slope of the Sierra Nevada Range. This vast woodland is about five hundred miles long and from twenty to thirty miles in width. Predominantly a pine forest, it



Sugar Pines and Yellow Pine, showing the large flat plates in the bark of the mature Yellow Pine contrasted with the smaller and shallower convolutions in the bark of the other trees.

locks hands, at the Siskiyou, with the broader zone of Douglas fir, which sweeps up the coast, through western Oregon, Washington and British Columbia, to the very edge of the Alaskan glaciers. But colossal as is the northwestern fir forest, holding in Washington and Oregon a full third of all the standing timber now left in the United States, yet the mid-Sierra belt of pines and firs embraces not only the most noteworthy trees for size and age which any country can claim, but also the finest open forests and the largest variety of conifers. The grandest of these cone-bearers, and therefore the world's noblest tree, the Sequoia, is found nowhere else.

When an observant lover of trees crosses this California forest, traversing the very gradual west slope of the Sierra from the comparatively barren foothill belt of digger pine and poison oak up clear to the timber-line beneath the snowfields, he discovers that the forest he has seen divides itself with some distinctness into belts or zones, corresponding, though with many variations, to the parallels of elevation shown by the contour lines of a topographic map. The variations, he learns with a little study, are



Jeffrey Pines, in the Inyo Forest, east of Yosemite Park. The adult tree seen here is one of the largest specimens, being about ten feet in diameter and 200 ft. high. This tree frequents bare granite slopes and the tops of Yosemite domes, where it often assumes dwarfed and fantastic forms; but under favorable conditions it attains a shapely and massive growth.

largely caused by differences in the character of the ground. Does it slope to the north or to the south? Is it level land, well planted with soil and well watered by streams, or rocky hillside, holding little of the melted snows? But in general the vital factor in determining tree species, is temperature. Trees that love the hot, dry lowlands not only shun the region of long winters and heavy snows, but they seldom invade the median zones of moderate temperature and precipitation. On the other hand, some trees prefer the colder levels. "Often," says Prof. Hall, "the line between two belts is as sharp as though cut with a knife; again the belts overlap and intermingle in so confusing a manner that even the expert is baffled in an attempt to distinguish them." But in general it is not difficult to discern the broad boundaries which climate and

rainfall have set for the several species. These establish type.

If there were an elevation midway the western slope of the Sierra and high enough to command the whole of the Yosemite National Park, any one who climbed to its summit might, with the aid of a powerful field-glass, see spread out below him a series of forest belts, running north and south, and distinguishable by the foliage of their dominant trees. On the east, the farthest strip would be a thin cover of alpine forest, mainly composed of gay white-bark pine (*Pinus albicaulis*) and somber mountain hemlock (*Tsuga mertensiana*). These two species alone inhabit the upper edge of their zone, dwarfed and pathetic forest outposts, no longer bearing the true form of trees, but starved by the cold, short season, and oppressed by the deep snow of long winters, until they are mere dense mats of tough, sprawling branches, on top of which even a horse could pick his



An Aged Juniper, inhabiting a moraine on trail from Tuolumne Meadows to Conness Creek. This picturesque and hardy tree, commonly known as Western or Sierra Juniper, is believed to outlive all its contemporaries save only the Sequoia.



Aspen Forest at Lake Merced. The large trunk at the right shows scratches from the claws of mountain lions, which delight in climbing these trees. The Aspen (*Populus tremuloides*) is the most widely distributed of American trees, ranging from the Arctic Circle to Mexico; and with the Black Willow (*Salix nigra*) it monopolizes the distinction of being common to both the Atlantic and the Pacific Coast.

loitering snow-crusts, in order that they may lose none of the too short summer. And hither come stragglers from the next tree zone, stray members of the far-spread lodgepole pine tribe (*Pinus contorta*), with occasional supporters of western white pine (*Pinus monticola*), foretelling the better covered areas of their own belt, the zone of the lodgepole or tamarack pine. This great tamarack zone shows many spaces occupied by Jeffrey pines, hemlocks and red firs. It is the first of the commercial forest, and, outside the Park, is beginning to contribute substantially to the necessary timber supply of the country. Below the tamarack forest we should see the great zone of the firs, red and then white, with sugar pines largely intermingled; and farther on to the west, the still more important yellow-pine zone, extending down to and even beyond the boundary of the Park.

Now, of course, there is no such commanding peak; but we are aided in imagining what we should see, if there were, by the views we obtain from such actual summits as overlook parts of the great Yosemite forest. Several of our illustrations in this volume tell us much. For example,

steps. Such is the timber line in the Sierra, at an elevation reaching well above 10,000 feet. But the lower border of this alpine belt, a thousand feet quite a different forest. Here the pines and hemlocks take courage from the less austere climate to stand erect. They gather in their first groups, along the little avalanche meadows, and offer shelter at their feet to some bright, intrepid flowers. This is the upward limit of the mountain "parks," where calochortus, cassiope and erythronium shoulder aside the



Largest Lodgepole or Tamarack Pine in the United States, found in the Sierra National Forest just south of Yosemite Park. This exceptional tree measured six feet in diameter and 150 ft. high, each dimension being double that of the normal type.

the remarkable pictures on pages 29 and 115 give us the story of the extreme alpine belt. In the former is shown Cathedral Peak Plateau, approximately 10,000 feet, and deeply covered with snow till mid-July. It is obvious that the forest here is fighting odds too heavy to enable it to form a real cover for the barren waste, which only recently, in geological terms, was abandoned by the glaciers. The second picture even more graphically tells the unequal struggle of the forest to push its advance guard up the long ridges of the Mt. Clark group, to the utmost limit of tree life.

But turn now to the illustration on page 20, showing what one may see from the top of Lambert Dome (9,400 ft.), in Tuolumne Meadows. Eastward, the view stretches from levels of less than 9,000 feet up to the snowy summits of the range. The forest below the spectator, as those who have explored the Meadows will recall, is mainly of lodgepole pine; and this tree predominates until, after covering the lower slopes of Dana, Gibbs and Mammoth, it at last finds the frost above 10,500 feet too constant even for its hardy constitution, and therefore yields the frozen ground to dwarf-pine and



Black Oaks and Ferns on Valley Floor.

alpine hemlock. Other illustrations confirm the story. For example, on page 27, the rising slope of Dana Mountain above Tioga Lake (9,700 ft.), is seen scantily decked with the same trees, which send up their prostrate outposts almost to the rim of the dying glacier.

But leaving these spectacles of Nature's struggle to beautify the alpine wastes, we must glance for a moment at the principal trees which constitute the main forest of Yosemite Park,—the trees which, outside the Park, furnish the bulk of the commercial timber of California. These we characterize in the order of our meeting them as we descend from the High Sierra to Yosemite Valley:

Lodgepole pine, the "tamarack" of the Sierra, called by some botanists *Pinus contorta murrayana*, to distinguish it from the scrub-pine (*P. contorta*) of the coast. Grows in dense stands as a straight slim tree, which furnished the Indians' tent-poles, hence the name. Height, 50 to 100 ft., though

the exceptional tree shown on p. 167 measured 150 ft. Most widespread of the pines, ranging from the Rocky mountains to tidewater on the Pacific, and from the Yukon to Lower California. Forms many fine homogeneous forests in Yosemite Park, at from 8,000 to 10,000 ft. (as in upper Tuolumne Meadows, on west slopes of Mts. Dana, Gibbs and Mammoth, and on Forsyth Pass). Easily recognized by its yellow-green foliage, arranged in "foxtail" tufts, the short needles growing in pairs; by its thin, scaly, grayish-brown bark, very resinous, and therefore giving the tree no fire protection; and finally by its small cones, which, when dry, cover the ground with thousands of little squat, pagoda-shaped burs, but which commonly remain closed on the trees for years, and are capable of resisting fire, thus insuring reproduction of the species in districts burnt over. Of future importance commercially.

Western white pine, the chief timber tree of Idaho and other parts of the Northwestern interior. Range within Yosemite Park, 6,000 to 10,000 ft., the finest examples appearing near the upper edge of its zone. Height, 100 to 150 ft. Bark, cinnamon-brown; checked in small squarish plates. Leaves in 5s, 2 to 4 inches long, blue-green. Cones 5 to 10 inches long, commonly curved; otherwise like sugar-pine cones, but much smaller. Timber almost as valuable as that of sugar pine.

The firs, red and white. Red fir named from its thick, deeply checked bark, which on older trees is dark purplish-red. Mature foliage dark green, but new growth light, silvery green, giving the tree its other popular name, "silver fir." Well deserves its botanical name, "magnificent fir," its compact, spire-like crown rising to 175 or even 200 feet, and making it one of the handsomest trees in the Sierran forests, where it attains its greatest perfection. Forms occasional pure stands, as on Rancheria Mountain, in the Yosemite Park, though more commonly appearing with white fir, sugar pine and the Sequoia. Range, from 7,000 to 9,000

ft., or even higher. Distinguishable from white fir by its larger cones, 5 to 8 inches, borne upright on the top branches, as well as by its bark. White fir gets its name from the whitish bark of young trees and the corky-gray bark of adults, the latter being much and irregularly roughened. Its cones are 3 to 5 in. long. Otherwise, it closely resembles its relative, though it is less stately in size, and its range does not extend beyond the 8,000 foot level.

Sugar pine (*Pinus lambertiana*), the most splendid of all white pines, and one of the most important trees, commercially, of the Sierra, which is its chief habitat. Noteworthy for its tall, straight stems, reaching 225 feet in height and 10 feet, occasionally more, in diameter. Easily distinguished from the familiar yellow pines by its foliage of darker green, its broader crown, which commonly throws out a few irregular branches far beyond the others, by its needles arranged in 5s, from 3 to 4 inches long, by its narrowly-furrowed reddish-brown bark, and by its remarkable cones, the largest on any tree, 12 to 24 inches in length, and hanging by short stems from the long upper branches. Popular name due to the white sugar exuding from any wound in the heartwood. Range 3,000 to 7,500 ft. Timber of great commercial value.

Western yellow pine (*Pinus ponderosa*) and its kin, Jeffrey pine (*Pinus ponderosa* var. *Jeffreyi*). Most abundant and useful of the 3-needle, or yellow pines, the former not merely outranking in number and yield all other timber trees of California, where, in the Sierra, it achieves its greatest perfection, but having a wider dispersion and adapting itself to a greater diversity of soil and climate than any other American timber factor. A tree of great distinction, often 6 to 10 ft. in diameter, with a straight trunk rising 175 to 200 ft. and a columnar crown of bright yellowish-green foliage, made up of needles 5 to 11 in. long, set in 3s and combined in great plumes, which distinguish this tree from all other conifers. Bark a grayish-brown, divided on adult trees by deep furrows into great plates, often 3 or 4 feet long and nearly a foot wide. Cones 3 to 5 in. long. Range, 2,000 to 6,000 ft. in the Yosemite Park, where it is the predominant tree on Yosemite Valley floor, and adds much to its beauty. Jeffrey pine has less height, a stockier trunk, broader crown, shorter needles of dark blue-green, and a range



A Beautiful Group of Red Fir, one of the noblest members of the great family of firs.



The "Diamond" Group, in Mariposa Grove. Such fine sculpturing of the thick fibrous red bark makes these great Sequoia trunks, often rising a hundred feet or more to their first limb, more beautiful than the fluted columns of a Greek temple.



Giant Sequoias at the Cabin in Mariposa Grove.

extending to 7,500 or 8,000 ft. Instead of seeking fertile watered valleys, it frequents barren ridges and summits of Yosemite domes, but under favorable conditions attains splendid symmetrical proportions. Covers large areas on upper edge of the yellow-pine belt.

Incense cedar (*Libocedrus decurrens*), last of the important trees contributing largely to the Yosemite forest. Common on the floor of Yosemite Valley. A handsome tree, seldom over 100 ft. high, but raising a broadly pyramidal crown of brilliant green on a conical trunk which is beautifully fluted in long plates of cinnamon-red bark, slightly grayer than that of the Sequoia. Seldom growing in pure stands, it is found almost everywhere within the 3,000-7,000 ft. zone mingling with the other conifers and adding color and beauty to the forest. Timber very durable and valuable.



The "Governor Tod" Group, one of the finest companies of Giant Sequoias in the Mariposa Grove.

Other contributors to the Yosemite forest picture, though numerous, are limited in their spread, and, save only the Big Tree, of less interest than the great forest-makers which I have thus briefly described. Douglas fir (*Pseudotsuga taxifolia*), sometimes called Douglas spruce, but in truth neither spruce nor fir, but a false hemlock, is the supreme forest figure on the North Coast. Here it is of smaller size and forms no large stands. In Yosemite Valley, it courts the damp shade of the south wall; on the plateau above, it is found at Nevada Fall, Glacier Point, sporadically on the Wawona and Chinquapin Roads, and among the Tuolumne Sequoias. But it nowhere attempts to repeat its Northwestern supremacy.

The oaks of Yosemite and similar valleys and cañons in the mid-Sierra have importance locally as factors in the landscape, but no timber value. Of these there are two. The intimate and highly decorative tree common on the rich valley bottoms is the broad-top, large-leaf deciduous species variously called Kellogg oak and California black oak (*Quercus kelloggii*, *Quercus Californica*). Its favorite belt lies just below that of the yellow pine; hence, while the pines outnumber the oaks in Yosemite the reverse was true at the lower elevation of Hetch Hetchy, before the trees were cut there in preparation for the San Francisco dam. The acorns from these oaks furnished the Indians with their meal for bread-making, and are stored by the woodpeckers for the winter food-supply. By an inexplicable error, however, Mr. Muir (*Yosemite*, p. 89), though he knew Yosemite better than most of us can ever hope to know it, ascribed this beneficence to the California live oak (*Quercus agrifolia*), a coastal oak which appears nowhere in the Park.

But Yosemite Valley owes the decoration of its walls chiefly to another live oak, the cañon oak, or Maul oak (*Quercus chrysolepsis*), perhaps best described by its other popular name, "golden-cup oak," given in recognition of the big turban-like cups that hold the tree's acorns, and late in summer are covered with a brilliant yellow down, seen afar. This tree never appears on rich valley floors, but covers the talus slopes with grateful verdure, and is common on dry high-line trails.

Western juniper (*juniper occidentalis*), familiar to all who travel to Merced or Tenaya Lake, is one of the most variable and picturesque of the sub-alpine trees in the Park. Its



The "General Sherman," largest of all trees, and monarch of the Giant Forest in Sequoia National Park. Its diameter of $34\frac{1}{3}$ feet at its base is a foot less than that of the "General Grant," but twelve feet above ground it is 27.5 feet.

largest growth, indeed, is attained in the Sierra; hence it is also called "Sierra juniper." Usually short and stumpy, it may rise to a height of fifty or sixty feet, or, on wind-swept ridges, it may exhibit merely a twisted, split, and misshapen stalk, topped with a grotesque crown. In the Yosemite Park, this juniper ranges to 10,000 feet or more, but is commonest on the benches of cañon walls, and at tops of cliffs. Notable junipers are to be found at the summit of Yosemite Point, and above Nevada Fall. At such low altitudes its stocky trunk often grows, in the centuries of its long life, to a thickness of five or six feet, and its flattened crown may be broader than the tree's total height.

I have left myself too little space to speak in detail of the noblest and most famous of all trees; but this default is the less serious in view of the full and accurate descriptions of the Sequoia now everywhere accessible, and will, I hope, be atoned for by the many pictures of typical Big Trees here shown. "By well-nigh universal consent," says Prof. Jepson, "*Sequoia gigantea* is regarded as the most remarkable member of the earth's silva. Its great age, its enormous bulk, its restricted habitat, its somewhat precarious biological foothold in the northerly part of its range, and its plain relationship with the dominant types of the Miocene flora, combine to give the species a unique interest."



"General Grant," one of the four largest and most famous Giant Sequoias. Its diameter at base is 35.75 feet, and at twelve feet up is 23 feet. This is the chief attraction of the General Grant National Park.



A Contemporary of Noah. The famous "Grizzly Giant," patriarch of the Mariposa Grove, has watched the career of man upon the earth probably for forty centuries. It is one of a few trees found in the several groves that are believed to be survivors of a former generation of Sequoias,—doubtless the oldest of all living things. This venerable Big Tree is thirty feet in diameter; its largest limb is six feet thick. Its height, 201 feet, however, is less than that of many younger trees, the storms having destroyed much of its crown. It shows few signs of senility, and may yet live many centuries.



"Alabama," in the Mariposa Grove. Its virgin crown, shaped like an arrow-head, has been exceptional in thus far escaping damage by storm.

Would you know what the famous Big Tree really is, how it outlives all its forest comrades, enduring by the pluck that meets calamity with a laugh? A volume of botanical data would tell less of its habits, its virility, than one may learn by seeing a single example of Sequoia well-doing. Let us visit the little Tuolumne Grove, on the west boundary of the Park. This contains only thirty trees, among them some of colossal size and perfect proportion. But we have come to see a burnt and shattered stump that sets forth the virtues of its clan more bravely than any of its comelier peers. It is the so-called "King of the Forest."

Among my boyhood friends was a worthy but broken old man. In earlier years he had served his community well. Then misfortune and ill health dealt him a cruel slap, and his kindly heart took on a veneer of eccentricity. He became a village "character." His neighbors, loving him but knowing the twist, put him gently by as a negligible "back number." But when a test came that tried the soul of our town,



A Typical Red Fir, on Rancheria Mountain.

it was "Old Ben," the superannuate, whose fiber and courage saved the day.

The forest life, too, has its crises; it provides tests of the hardest. And as human wrecks often regain their footing and make good, so a tree that by all signs is down and out, like an obsolete and seedy politician, or king discrowned,—may not it "come back"?

Originally our tatterdemalion "King of the Forest" was one of the noblest Big Trees. It had a circumference of more than ninety feet. Its height was doubtless three hundred. Its crown was worthy of a monarch of giants. Around it the tides of ordinary tree life rose and fell. Pines and firs, the sturdy commoners

of the forest, spanning out their little generation of three or four centuries, came and went. But His Sequoia Majesty ruled on. For two thousand years, or even three, it was the pride of its stately grove.

Then came disaster that would have wiped out any other tree. Fire destroyed one side of it, and ate away its heart. Of the huge bole there remained hardly a half cylinder of sound wood and thick cinnamon-colored bark. The crown fell, but this charred fragment stood, ninety feet of hollowed stalk, still flaunting two or three scorched and ragged little branchlets. It seemed merely a lopsided and ludicrous monument to departed grandeur. Surely even a forest king, in such plight, might yield without dishonor, and returning to the soil await reincarnation in another age of Big Tree life. But not the unconquerable Sequoia. Blood will tell! So long as a sound root remained, and sap still flowed, this "king" would be no less than kingly.

Mustering its diminished resources, the stricken monarch held its ground. It is the Sequoia way, if a tree

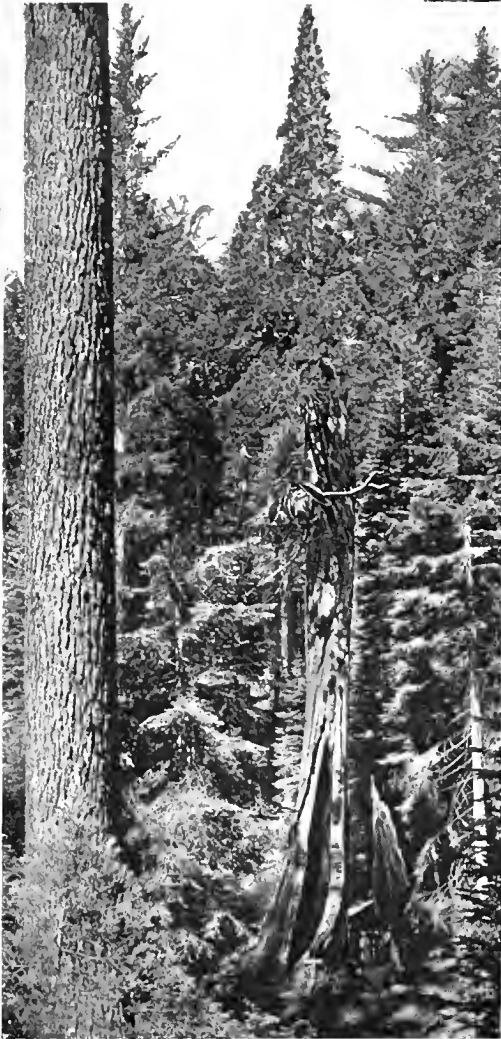


Maul Oak (*Quercus chrysolepis*), on Wawona Road. This familiar tree, also known as "Cañon Live Oak," "Gold-Cup Oak," etc., is common on hillsides and cañon walls in the lower half of the Park, and covers the talus and rock ledges of Yosemite and Hetch Hetchy with low-spreading evergreen foliage.



Mariposa Lily (*Calochortus venustus*).

be weakened by fire, to clutch the soil more broadly than before. Thus, here, the few remaining roots were sent farther out, and new stores of nourishment drawn upon. But it must do more than feed. It is a tree's office to be beautiful. It is a king's right to wear a crown. So now the surviving



"King of the Forest," a mere shell, left by fire, of what was once the monarch of the Tuolumne Grove; now making an heroic effort to rebuild its crown, and get a new start in life. The three figures at its base show that its diameter was nearly thirty feet. The fine tree in the foreground (left) is a six-foot Red Fir (*Abies magnifica*).

branchlets are cheerily turning upward,—also after the habit of the species when, crushed by lightning or storm, it quickly

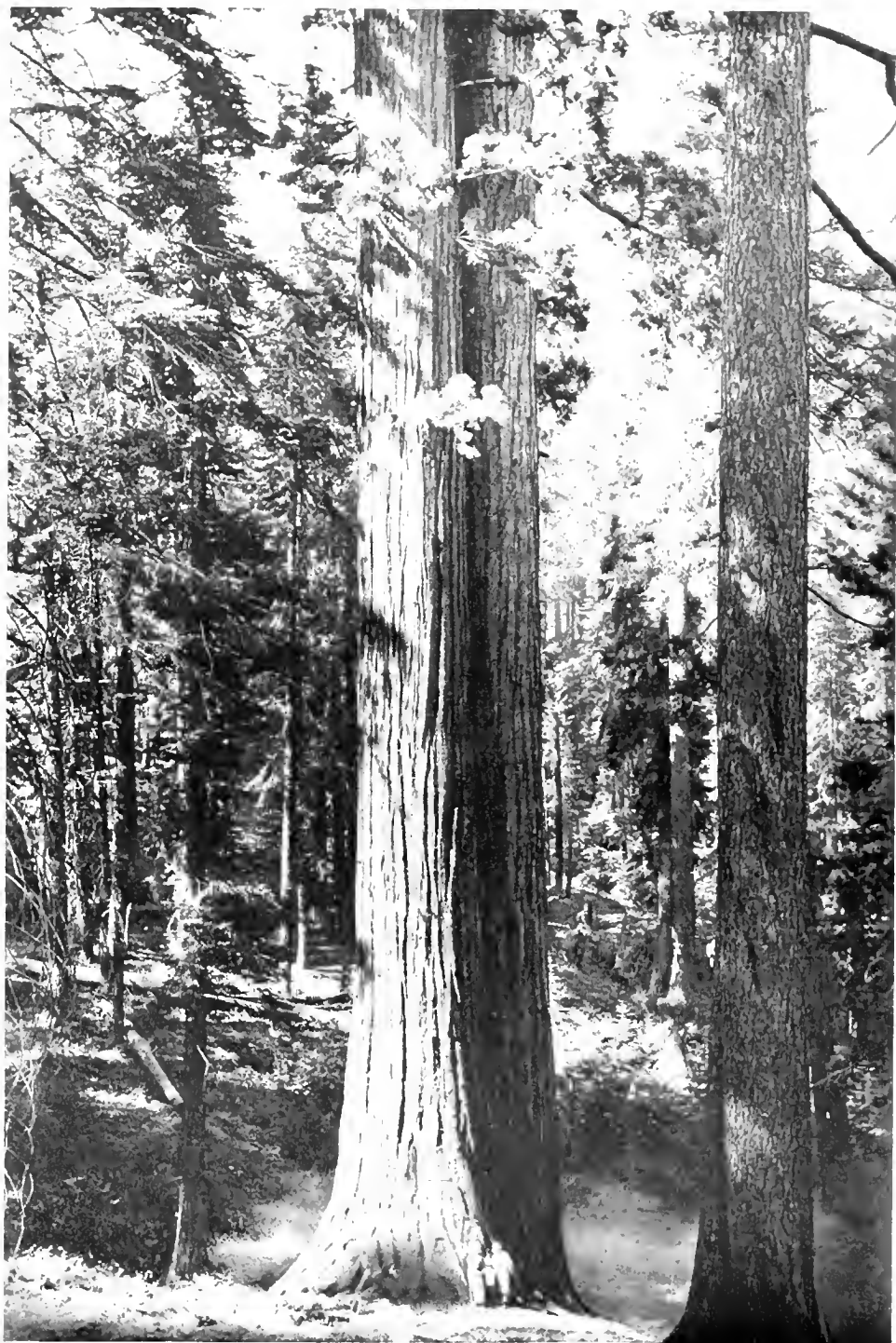
rebuilds its top; and one of them has already taken shape there, far aloft, as a symmetrical young tree, undaunted by adversity, and fighting for its share of air and sunshine. Thus would the living skeleton hide its shame by grace of new foliage. Here's wishing it luck! Royal endurance merits homage. Long may so kingly a forest "character" play a part in the tree world! An eminent expert, famous for his knowledge of mankind, once



Three Veterans,—the "Haverford" and "Ohio" trees in the Mariposa Grove, and Galen Clark at the age of 95. This is said to be the last picture of the celebrated "Guardian of Yosemite," who died a year later, in 1910. The "Haverford," named for the college in Pennsylvania, illustrates the Indian practice of using Big Trees as backlogs for fires. Although its core was burnt away, leaving a cavern that is reputed to have sheltered seventeen horses and their riders, its remaining roots have reached out the more stoutly for nourishment, and are supplying ample sap to stalk and crown.

declared: "Skin for skin, yea, all that a man hath will he give for his life." This Sequoia King, more than human in its tenacity, is a veritable Job of the forest. Its faith forbids death. Better to keep on growing against odds, better to live even as a misshapen cripple, showing what humble beauty it may, than to stand a black and rotting shell where once it reigned Sovereign of the Woods! Truly, it is not alone in the Forest of Arden that we

Find tongues in trees, books in the running brooks,
Sermons in stones.



"The Twins," a splendid double tree in the Tuolumne Grove.

NOTES FOR YOSEMITE VISITORS

I. ROADS, TRAILS, BRIEF EXCURSIONS.

The short-time visitor to Yosemite will naturally wish, first of all, to see the great things near at hand. If he comes in his automobile, he will want to explore the Valley floor, traversing both the North- and South-side Roads from Happy Isles and Mirror Lake, the present limits of eastward motor travel, west to and beyond the "Gates of the Valley." This will enable him to obtain a general view of the Valley's colossal walls, note their characteristic sculpturing, and see at some leisure, if not close at hand, two of their most important cataracts, Bridal Veil and Yosemite Falls. He should also climb with his car at least to Inspiration Point, on the Bridal Veil-Wawona Road, to enjoy the tremendous picture it offers of the Valley as a whole. This famous outlook discloses less of beauty, no doubt, than does the view from the North Road on the bank of the Merced just west of Bridal Veil Meadows (see Frontispiece of this volume), but it tells even more of the height and massiveness of the well-proportioned features in the Yosemite scene (See p. 35).

No one, however, should leave Yosemite, if he can help it, without seeing more than can be seen from the seat of an automobile. A vast deal of the Valley's beauty must be learned from the trails. For example, only by their help can one gain a near-by view of any of the waterfalls, or any satisfactory view at all of the incomparable cataracts in the Merced Cañon above Happy Isles. The three falls to be viewed there—Illilouette, Vernal and Nevada—are among the world's noblest spectacles; and few persons are so poor in time and strength as to be unable to ride, if not to walk, to some of the good viewpoints commanding them.

Cataracts of the Merced Cañon.—Thus a ride or tramp of a mile over the horse-trail above Happy Isles brings one past the foot of the Illilouette's branch cañon, with a fine distant view of Illilouette Fall itself (See p. 87), and to the bridge over the Merced. This is half a mile below Vernal Fall, which is well seen from here, and still better seen from either of the trails beyond (See p. 89). The lower or "Mist Trail" (foot travel only) leads along the south bank of the river, unfolding a succession of remarkable pictures, and quickly gains the very side of Vernal Fall, midway of its height. After enjoying near-by views of the cataract and its famous rainbows, and getting somewhat damp in the mist which fills the cañon, the climber finally ascends a well-guarded stairway cut in the face of the vast perpendicular cliff over which Vernal pours, and reaches the platform above, at the brink of the cataract (See p. 91). The same startling but safe viewpoint may be reached on horseback by the upper trail from the bridge. On this ride, which is half a mile longer than the foot trail, the rider should pause long enough at Clark Point to study the scene below and beyond, which includes not only Vernal Fall,



Ready for the Trails.



Liberty Cap and Nevada Fall, Seen from Clark Point, above Vernal Fall.

but also Nevada, a mile farther up the river, with Liberty Cap and the Half Dome towering above and contributing mightily to the great picture painted by the old Merced Glacier.

Easily continuing for this additional mile to the foot of the cataract, the visitor ascends the famous Zigzag Trail, through a small cañon cut by the glacier at the side of Nevada Fall, gains amazing nearby views of that great spectacle (See pp. 96, 97), and, after crossing the moraine above, finally stands on the north rim of the rushing Merced, where it gathers power and speed for its tremendous leap into the air and its 600-foot drop. Here he should not fail to climb down to the guarded platform at the very head of the fall (See p. 90).

From the Top of Nevada Fall.—The Nevada Fall platform (six miles from Yosemite Village) is a convenient resting place and starting point for other delightful trail ventures. From here one goes to Little Yosemite, a mile farther along the river, and on up the cañon to Merced and Washburn Lakes, where trout bite and Merced Lake Lodge offers good accommodations for an indefinite stay. Or he turns north from Little Yosemite for the ascent of Half Dome and Clouds Rest. But if he is limited in time, his best choice will be Glacier Point. Crossing the bridge over the Merced above Nevada Fall, he quickly climbs the south rim of the cañon and reaches Panorama Point, with its fine views of the Merced and Hlilouette below, and Half Dome beyond; descends to Hlilouette Fall, easily seen from its head, by a short trail from the bridge over Hlilouette Creek; and ascends the long slope of Glacier Point to the charming new hotel at its summit and the world-famed views with which this great outlook rewards the visitor (See pp. 23, 68, 102, 103). If possible, he should spend a night here; the sunrise over the High Sierra and the morning songs of Vernal and Nevada, heard from their granite seats below, will make him glad to be alive. The return to Yosemite Village should be made by the "Short Trail" (four miles), leading down past Union Point and the foot of Sentinel Rock (See p. 31). This trail unfolds changing pictures of the Valley itself, and the deep booming of Yosemite Falls, across the way, is never to be forgotten.

Other trail routes back to the Valley are the Ledge Trail and the Pohono Trail. The former leads directly down from Glacier Point, two miles; but is not practicable for horses, and indeed should not be attempted by persons without experience in climbing. The Pohono Horse Trail offers a splendid scenic trip of twenty miles to Yosemite Village. Leaving Glacier Point Hotel, it passes Sentinel Dome via the Chinquapin Road, then turns off to Taft Point and the Fissures, touching the other main outlooks on the south rim, and finally reaching Fort Monroe for the return to the Valley floor by Wawona Road and Inspiration Point.

Glacier Point may be reached, or left, not only by the trails, but by automobile stages or private cars over the Wawona-Chinquapin Road. This fine scenic route is followed by thousands of motors each season. No one who wants to see the best that Yosemite has for the hurried visitor should go away without getting to Glacier Point by one of these routes. In time, no doubt, the inclined tunnel will add a route protected from snow, making upland winter sports part of every winter visit.

On the north wall of the Valley, two great routes, Yosemite Falls Trail and Snow Creek Trail, lead to the plateau above. The former trail quits the Valley floor a quarter of a mile west of Yosemite Lodge, rises a thousand feet over the earthquake talus, through a forest of fine golden-cup oaks, to Columbia Rock; thence turning east it traverses a broad ledge, with constantly changing views of the Valley and its heights, to the foot of Yosemite Upper Fall, which can be reached by a short detour, and finally zigzags up the little glacial cañon west of the fall to the hanging valley of Yosemite Creek above. The brow of the fall is easily gained, and is well worth a visit for its near view of the falling stream, and of the remarkable jointing of the Valley wall, which enabled the old Yosemite Creek Glacier to dig back this deep side cañon in which the Upper Fall hangs (See pp. 80, 81). But the trip is not complete till one has climbed still higher, to Yosemite Point (five miles from Yosemite Village), and enjoyed the fine glacial landscape modeled by the Yosemite Creek Glacier, and the splendid outlook over the Valley and up to the High Sierra on the east.

Three branch trails lead from the head of Yosemite. One is to Eagle Peak, highest of the Three Brothers, and thence to the top of El Capitan. A second trail leads north, following up Yosemite Creek to Tioga Road, and commonly forms the first part of a trip of several days to Ten Lake Basin and other north-side points of interest. The third trail offers the best route to the top of North Dome, where perhaps the most impressive view of Half Dome may be had. Return to the Valley may well be made via the Snow Creek Trail, a total of twenty miles from the morning's start at Yosemite Village.

Snow Creek Trail itself invites the visitor especially to a two-day round trip to Tenaya Lake, one of the most interesting spots near the Valley. This journey should be begun early, as after passing Mirror Lake (where the fine sunrise reflection is seen at about 8 o'clock of a summer morning), there is a 2,500-foot climb by a hundred switchbacks, and the sun on this north wall becomes very hot before noon. The rising trail commands notable views of Half Dome and its neighboring Quarter Domes, and of the glaciated slope of Clouds Rest, across Tenaya Cañon, as well as of Basket Dome on the north wall. After reaching the rim of the cañon, the climber may turn west to North Dome, and thence proceed to Yosemite Head and descend via the Yosemite Falls Trail, or he may continue over the Mt. Watkins ridge and along the north rim of Tenaya Cañon to a junction with Tioga Road, which quickly brings him to Tenaya Lake. Here an excellent Lodge offers accommodations for interesting days of mountain climbing, or a starting point for a further journey to Toulumne Mead-



Climbing the Zigzag Trail, at the side of Nevada Fall.



Sugar Pine.

ows. Return from Tenaya may well be made by Forsyth Pass Trail, across the ridge east of Clouds Rest, and back to the Valley via Nevada Fall. The sunny pass (9,000 ft.) is full of glacial autographs.

Other inviting trails lead from Glacier Point, from Merced Lake, and Tenaya Lake, and Tuolumne Meadows, but the ones named offer the best short trips for the visitor who is limited in time.

Those who wish to go farther afield and visit parts of the Yosemite Park not reached by a one-day trip from Yosemite Village may obtain information at the office of the Superintendent of the Park as to trails, outfits, and camping conditions. Much of such information may be found in the pamphlet, "Rules and Regulations, Yosemite National Park," to be had free at the Superintendent's office or by mail from the National Park Service, Washington. Every visitor should study this booklet.

Many vacationists spend months in the Park uplands, "hiking" to out-of-the-way points, not so far removed from some of the hotels, lodges or camps as to be unable to obtain all needful supplies at frequent intervals. Such mountaineering provides a delightful vacation at very moderate cost. The Superintendent of the Park and the Yosemite National Park Company will furnish information of value to those contemplating such an outing. The Yosemite National Park Company also furnishes complete equipment for independent camping trips, including transportation, if desired, with guides and supplies.

II. TRANSPORTATION.

For persons coming to Yosemite by rail there are two methods of reaching the Valley. By the first, the visitor leaves the Southern Pacific or Santa Fe Railroad at Merced, 145 miles from San Francisco and 330 from Los Angeles, and travels by the Yosemite Valley Railroad 78 miles to El Portal, near the western boundary of the Park, whence the Yosemite National Park Company operates an automobile stage line to Yosemite Village, 12 miles. The other route carries him from Merced by the auto stages of the Yosemite Stage and Turnpike Company to Mariposa Village, thence to the Mariposa Big Tree Grove, Wawona, and Yosemite. Visitors entering by either route may leave by the other.

The Yosemite National Park Company has an exclusive concession for other transportation within the Park, and maintains excellent service to the Mariposa, Tuolumne and Merced Groves of Big Trees, to Hetch Hetchy, and, via Tioga Road, to Tenaya Lake, Tuolumne Meadows, Tioga Pass, Mono Lake, and Lake Tahoe. The Company maintains well-

equipped lodges at Tenaya and Merced Lakes, and provides guides and horses for those who wish to travel thither by trail.

Fuller information regarding transportation may be had from either of the companies named by addressing them at Yosemite, California.

III. ENTERTAINMENT.

Next to getting Congress to vote money for improvements, the problem of caring properly for the growing tide of visitors has proved the hardest nut for the National Park Administration to crack. For the protection of tourists, it must annex strict conditions to leases, and limit them in time. These restrictions, with the shortness of the mountain season, render any large investment a risk which few capitalists care to assume. Hence, in Yosemite as well as in other parks, hotel-camps have been found the most economical, as giving the largest amount of accommodations on a moderate expenditure. Yosemite has perhaps the most typical and populous camps of this sort in any of the National Parks.

Camp Curry.—This representative Yosemite resort is only less famous than Yosemite itself. It has enabled thousands to know Yosemite who, but for its good service at moderate prices, would never have seen it. For twenty-two years it has been a factor in the entertainment of Yosemite visitors, and during more than half that period its efficient organization and the personal supervision of its intelligent owners have made it the largest single factor in such hospitality. For the privilege of rendering this useful public service it has paid to the Government many thousands of dollars in license fees and percentages.

The Camp was opened by the late David A. Curry on June 1, 1899. Mr. Curry and his wife, both of whom had been students under David Starr Jordan in the Uni-



Camp Curry's Social Life Centers about Its Camp Fire, in this Court.

versity of Indiana, followed their friend and former teacher to the Coast, where Curry was a public school principal, and sometimes assisted Dr. Jordan in managing his vacation tours with students. Out of this helpful association grew the plan to establish a hotel in tents, in Yosemite Valley.

David Curry was a man of integrity, resource, and unflagging energy; but while thousands remember him for these sterling qualities, the foundation of his great resort, still more, no doubt, affectionately recall "the Stentor's" splendid physique and voice as he greeted the Overhanging Rock at Glacier Point, overhead, or speeded a receding stageload of parting guests to a quick return. He was indeed an ideal Boniface. His enterprise, now known in all parts of the world, started with seven tents,

pitched around a camp fire,—the only part of Camp Curry that has not been moved. Its first guests were a party of school teachers. When the season ended, the number of tents had increased to twenty-three, and the total of those enter-



Camp Curry, delightfully situated among the pines at the foot of Glacier Point one mile from Happy Isles. This is the largest of the tourist camps in Yosemite Valley. The little Douglas squirrels are common throughout the Park.



tained to 290. From this small beginning, the Camp has grown steadily about its central camp fire, until it now has 650 tents and thirty bungalows, accommodating a thousand guests. Its more permanent buildings, which began in 1900 with the erection of a dining hall, now include a score of roomy structures, among which are the central offices, an auditorium much used both as a convention hall and ball room; a large and attractive "studio," a billiard hall, bath houses and swimming tank, laundry, and a garage which is the largest building in the Valley, with shelter for nearly two hundred cars.

"A distinguishing feature of Camp Curry," says Superintendent Lewis of the Yosemite Park, in his last annual report, "is its complete electric-cooking installation. With one of the largest, if not the largest electro-cooking installations in the State, practically all of the cooking and baking for the camp's guests, reaching at times as many as 1,100, is done by this most modern and sanitary means."

The Camp is placed in a grove of splendid pines, firs and cedars, a mile below Happy Isles, and almost within the shadow of the great wall of Glacier Point, tower-

ing more than 3,000 feet above. The original center of the Camp's social life, the camp fire, still holds its importance as a rendezvous, to which come, night after night, throngs of guests, to listen to music by experts, to hear lectures and addresses by distinguished speakers, and to see moving-picture shows illustrating the great scenery of Yosemite and explaining its origin. Since the death of Mr. Curry in 1917, the Camp has been conducted with continued success by Mrs. Curry and her son, Mr. Foster Curry, ably assisted by Mr. Wallace B. Curtis, associate manager.

Camp Curry is a favorite resort for automobilists. Among the causes of this popularity are the prizes offered by the Camp in several annual contests, the most noteworthy of which are the Economy Runs from Los Angeles to Yosemite, held annually for the last five years during the first week in May under the sanction and rules of the American Automobile Association. This event attracts nation-wide attention, as establishing a standard test for automobile mountaineering.

Yosemite National Park Company.—The Yosemite Park, however, requires more than single camps. The Park Administration's problem, therefore, has been to find an organization strong enough financially to provide, not only the larger and varied accommodations now needed in the Valley, in summer and winter, but also to keep pace with the proposed road and trail development by the Government by establishing camps—and hotels, too, if needed—in other parts of the Park, and carrying visitors to them.

This meant an investment of millions, with a probability that profits, though assured, might be deferred. After several years' effort, Director Mather at last induced San Francisco and Los Angeles business men to form a corporation, the Yosemite National Park Company, which took over the Desmond concessions and properties in 1918, including the beautiful new hotel at Glacier Point, and the lodges at Merced and Tenaya Lakes. This company has enlarged Yosemite Lodge by adding many bungalows, modernized the Sentinel Hotel in Yosemite Village, and established a lodge at Mariposa Big Tree Grove and at Mather Station on the Hetch



View from Stanford Point, on the South Rim of Yosemite Cañon, west of Bridal Veil Fall. This picture is of interest to motorists, because in the distance Big Oak Flat Road is seen descending to the floor of Yosemite Valley. Many thousands of automobiles enter the Park each season over this steep old toll road, hung on the side of the great north wall. It will no doubt be largely supplanted when California completes the State highway now building from Mariposa to El Portal, thus opening a low-grade road of great scenic value from the San Joaquin country up the Merced River level, at the bottom of this gorge, and directly on to the Valley floor. (Compare the first illustration, "Dawn in Yosemite Cañon," page 2.)

Hetchy Railroad; and it is planning further additions. Information as to its excellent service may be obtained by addressing the company at Yosemite or San Francisco.

IV. AUTOMOBILES.

Automobiles are now admitted to Yosemite Park, subject to the simple restrictions printed in the Park Service pamphlet, *Rules and Regulations, Yosemite National Park*, to be had free at the Superintendent's office, or from the National Park Service, Washington, D. C.

Vehicles enter from the south and west (Fresno, Madera, Merced) via Wawona and the Mariposa Big Tree Grove, and follow the Wawona-Bridal Veil Road down the south wall of the Valley; or from Stockton and Modesto, by the Big Oak Flat or the Coulterville Road, both of which descend the north wall to the Valley floor. As soon as these upland roads are open, in early summer, information of the fact is given to the several automobile associations in California, and tourists may learn the state of the roads from them, or by addressing the Superintendent's office, Yosemite, Calif.

From the east, cars enter the Park via Mono Lake and the Tioga Road, not open till midsummer. They reach Mono Lake from Lake Tahoe on the north, Tonopah on the east, and Bishop on the south, over good State highways.

Owners who wish to avoid driving their cars over the steep mountain roads may ship them from Merced to El Portal, via the Yosemite Valley Railroad, at a charge of \$12.85, including war tax. Many owners bring in their cars thus, for use in the Park.

The California State Automobile Association maintains a branch office at Yosemite Village, in conjunction with the Park Service Information Bureau. Here the best information obtainable regarding road conditions is collected, furnished free to motorists, and disseminated through the association's city offices.

V. NATURE-GUIDE SERVICE.

A free nature-guide system has been established in Yosemite Valley by the National Park Service and the California State Game and Fish Commission. The object is to enable visitors to understand and name the trees, plants, birds, and other wild things seen in the Valley and on the trails. Two well-known California naturalists, Dr. H. C. Bryant, of the University of California, and Dr. Loye Holmes Miller, of the Southern branch of that institution, are in charge of the work, delivering illustrated lectures at the different camps, and leading parties of visitors afield for intimate study of the roadside life. This work is steadily being extended to include special excursions for children, and to interest still larger numbers of adults by trips to the upland at Glacier Point and elsewhere. This invaluable and popular service is free to all who care to take advantage of its instruction and advice.



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Bear and Cubs, in Mazonette Cañon.

VI. LE CONTE MEMORIAL LECTURES.

The Le Conte Memorial Lectures in Yosemite are established and maintained by the University Extension Division of the University

of California as a memorial to the late Joseph Le Conte, the famous professor of geology and natural history in that institution from 1869 to 1901. Specialists in geology, biology, zoology, botany, Indian lore, and other scientific subjects illustrated in Yosemite will lecture in popular language on their especial themes. Admission is free. Dates, speakers, and place are well advertised in the Valley and through the public press, or may be learned at the Superintendent's office in the Park, or the Extension Division, University of California, Berkeley.

VII. YOSEMITE MUSEUM.

The Yosemite Museum, designed to exhibit the history, ethnology, physical geography, flora and fauna of the Yosemite region, was opened in the spring of 1921. It occupies the former Jørgensen Studio, across the bridge from Yosemite Village. Its central feature is a large "relief map" of Yosemite Valley, designed and modeled by Ansel F. Hall, author and Park ranger. This useful model was constructed by the aid of photography, on a horizontal scale of 11 inches to the mile, the work being built up of strips of cardboard covered with plaster, carefully shaped by hand, to exhibit all contours, elevations, roads, trails, and other Yosemite features.

The Museum has much else to show, several interesting collections having been given or loaned by friends of the National Park Service. These include the notable collection of Yosemite Indian baskets assembled by Dr. Sargent of Lodi, the McFarland Indian collection, and a large collection of Yosemite butterflies made by the Cali-



Relief Model of Yosemite Valley, a feature of the Yosemite Museum just opened in the former Jørgensen Studio, Yosemite. This great "map" is a faithful reproduction of the Valley's contours, designed and modeled by Ansel F. Hall, of the National Park Service.

ifornia Academy of Sciences. Not least interesting among the exhibits promised are two venerable stage coaches, one the first stage brought into the Valley, having arrived in sections during the late '60's. The other saw regular service in the Bret Harte days between Angels Camp and Murphy's. A fine collection of samples of Yosemite woods is the gift of a near-by lumber company.

Thus a good beginning has been made towards an instructive and comprehensive exhibit of the natural science of the Park.

VIII. YOSEMITE LITERATURE.

The useful pamphlet, *General Information Regarding Yosemite National Park*, may be had gratis at the office of the Superintendent in Yosemite Village, or by mail from the Department of the Interior, Washington, D. C. It contains brief notes on the Park and its elevations, distances, trails, etc.; size of Big Trees in Mariposa Grove; rules and rates of transportation; hotels, camps, and camping outfits; automobile regulations; and a bibliography of books and magazine articles. Three other government pamphlets are for sale at the Superintendent's office: *Sketch of Yosemite National Park*, a popular account of Yosemite geology by F. E. Matthes, U. S. Geological Survey, price 10 cents; *The Secret of the Big Trees*, by Ellsworth Huntington, 5 cents; and *Forests of Yosemite, Sequoia and Gen. Grant National Parks*, by C. L. Hill, 20 cents.

A capital *Yosemite Guide Book*, by Ansel F. Hall, of the National Park Service, is to be had at all the studios, price 50 cents. It describes all roads in the Park, with the trails south of the Tuolumne. *Foley's Yosemite Souvenir*, a handy pocket guide, may be purchased at J. D. Foley's studio in the village.

Handbook of Yosemite National Park, Ansel F. Hall editor, 1921, is the amplest contribution yet made to the popular science side of Yosemite literature. The book mainly comprises essays on the history, Indians, geology, life zones, birds, animals, reptiles, fishes, insects, trees, Giant Sequoia, and flowers of the Yosemite Park, written by professors in the University of California. Other informing papers on the National Park Service and Yosemite Park Administration are contributed by Director Mather and Superintendent Lewis, and articles on camping, motoring and photography by local experts.

Arthur C. Pillsbury, Yosemite photographer, to whom the present volume owes many of its finest illustrations, has in hand a much-needed book on the wild flowers of the Yosemite-Tahoe Sierra. This publication, for which Mr. Pillsbury's accomplished wife is writing the text, will render a service not hitherto undertaken for lovers of the mountain flora by showing a very large number of plants in bloom, in color plates carefully prepared from nature. Pillsbury is one of the foremost American photographers, and these photographic studies of California flowers have for years occupied much of his time and interest. Advance orders for "California Mountain Flowers in Color" may be placed at the Pillsbury Studio in Yosemite, or at the city store, Pillsbury's Pictures, Inc., 501 Geary Street, San Francisco.

Of the earlier books, Dr. L. H. Bunnell's *Discovery of Yosemite*, 1880, 4th ed., 1911, is the best account of the Indian war of 1851 and the visits of the Mariposa Battalion. The last edition is handsomely illustrated from photographs by Boysen. *In the Heart of the Sierras*, by J. M. Hutchings, 1886, is a history of the Valley by one of its earliest residents. Prof. J. D. Whitney's *The Yosemite Guide-Book*, 1871, despite its obsolete theory of the Valley's origin, is a very readable and informing essay. *Mountaineering in the Sierra Nevada*, 1871, by Clarence King, Whitney's associate in the geological survey of California, is one of the best books inspired by the mountains of the West.

Three booklets, *Indians of Yosemite Valley*, 1904; *The Big Trees of California*, 1907, and *The Yosemite Valley*, 1910, by Galen Clark, discoverer of the Mariposa

Grove, and long the Guardian of Yosemite under the State régime, contain much first-hand information. A charming and most valuable description of the Park, with its glaciers, past and present; its forests, flowers, birds and animals, is to be found in John Muir's *Yosemite*, 1912. Muir's other books, *My First Summer in the Sierra*, 1911; *The Mountains of California*, enlarged ed., 1913; and *Our National Parks*, 1909, are also full of Yosemite. Naturalist and geologist as he was, Mr. Muir, rather than Joaquin Miller, has been the real poet of the Sierra, though he wrote in prose. His books are after all not so much treatises on its natural history as delightful interpretations of its spirit. *Yosemite Trails*, 1911, by J. Smeaton Chase, is an enjoyable account of the Yosemite uplands, especially useful on their trees and flowers. Mr. Chase's little manual, *Cone-Bearing Trees of the California Mountains*, 1911, will also be found of service.

The standard handbook on the botany of the Park is *A Yosemite Flora*, 1912, by Prof. Harvey M. Hall and Carlotta C. Hall. Untechnical in style and excellently illustrated, with keys for identifying the trees and flowers, this accurate manual is invaluable for field work. Prof. Willis Linn Jepson's *The Trees of California*, 1909, is well planned for laymen's use, and capitally illustrated. It is not to be confused with his monumental and technical *Silva of California*, published by the University of California. Supplementing these popular handbooks, Sudworth's *Forest Trees of the Pacific Slope*, 1908, published by the U. S. Forest Service, covers the Sierra forests with the same thoroughness given to the rest of its subject.

The eleven volumes of the *Sierra Club Bulletin* contain a store of papers by experts, covering not only the Yosemite country, but also the great mountains of the Kings and Kern River basins. These admirably edited publications, with a considerable library of other mountain literature, may be consulted at the Sierra Club's headquarters, the Le Conte Memorial Lodge, near Camp Curry. In the general periodicals of this country and Europe, Yosemite and Hetch Hetchy Valleys have received more attention than any other American scenic district, and many noteworthy articles may be found through the periodical indexes and magazine files at the public libraries.

IX. YOSEMITE PHOTOGRAPHS AND MOVING PICTURES.

All hotel and camp news-stands in the Park sell original photographs of Yosemite and Hetch Hetchy Valleys, the Big Trees, and High Sierra scenery. Collections of the finest photographs may also be found at the studios of the Pillsbury Picture Company, J. T. Boysen and other photographers in Yosemite Village, and at the Camp Curry Studio, where Ralph C. Anderson is the photographer. The last-named studio now owns the noteworthy negatives of that artist-photographer, the late George Fiske. Photographs and enlargements by Fiske, Boysen, Pillsbury or Anderson, corresponding to their pictures reproduced in this volume, and listed in the Table of Illustrations on pp. 11-15, may be had by calling at, or writing to, the studio concerned.

Moving pictures showing scenes in all parts of Yosemite National Park, including the great cataracts, waterwheels and avalanches in action, and the mountain wild-flowers developing from bud to full bloom, attract many visitors to the Pillsbury Studio each evening in the season. Motion-picture shows also form a drawing feature of the evening camp fire entertainments at Camp Curry and Yosemite Lodge.

• ERRATA.

On page 114, the notice, "Copyright, Pillsbury," which should appear under the illustration, was inadvertently omitted. The fact that this illustration is from a copyrighted photograph is indicated by the * in the Table of Illustrations, page 14.

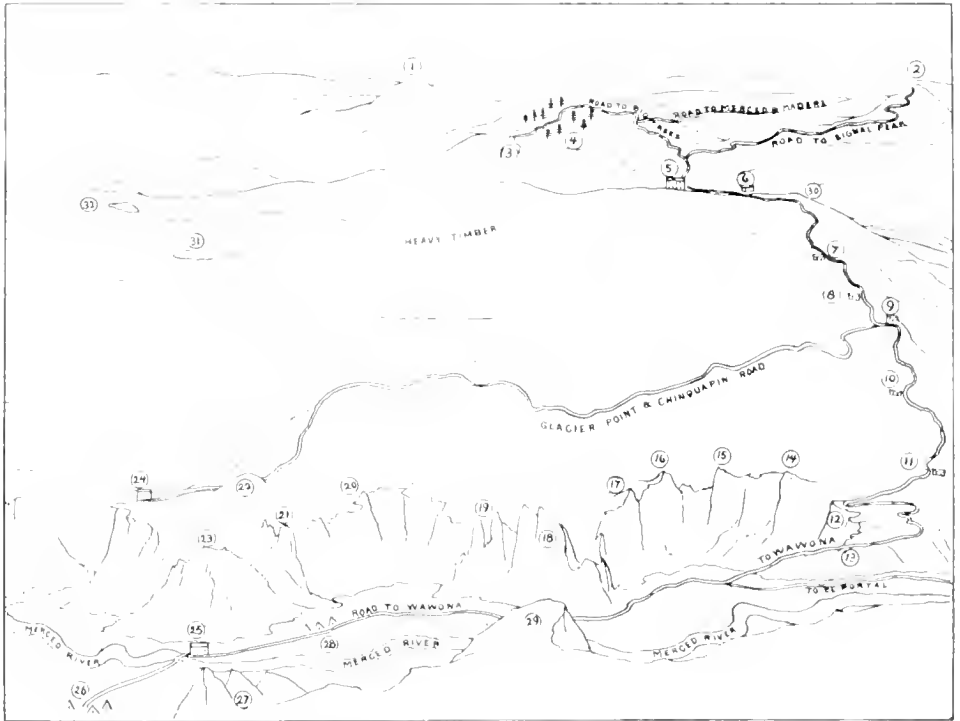
On page 123, in the second caption, and on page 124, line 1, "Triple Divide Peak" should read: Triple Divide Pass.

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Figures in light face type refer to the text, those in heavier type to illustrations.

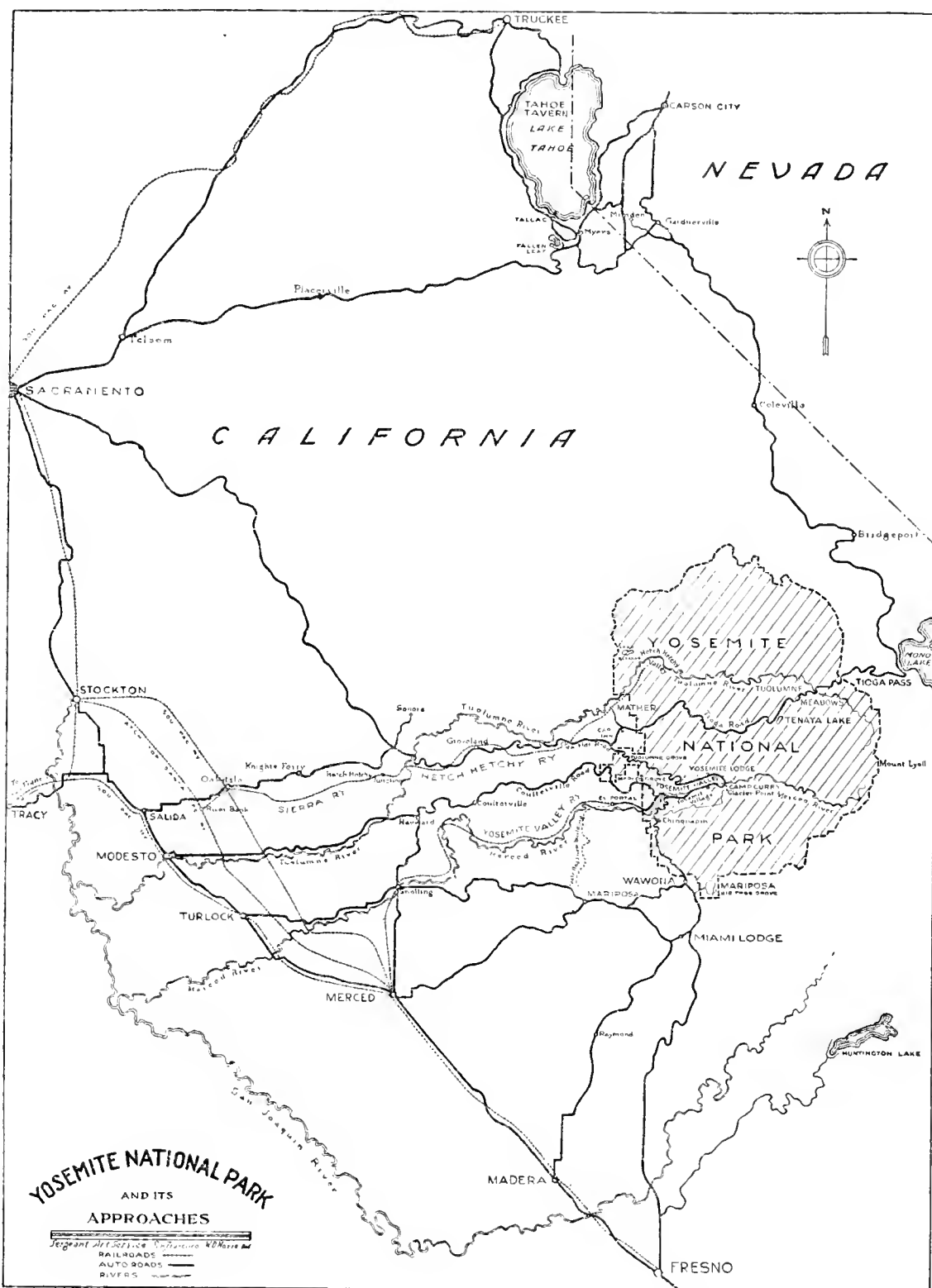
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FROM YOSEMITE VALLEY TO WAWONA AND THE MARIPOSA GROVE

- | | |
|----------------------------|--|
| 1. Mt. Raymond (8,548 ft.) | 17. Dewey Point |
| 2. Signal Peak (7,079) | 18. Cathedral Rocks. |
| 3. Wawona Point | 19. Cathedral Spires. |
| 4. Mariposa Grove | 20. Taft Point. |
| 5. Wawona. | 21. Sentinel Rock. |
| 6. Fish Hatchery. | 22. Sentinel Dome |
| 7. Eight Mile. | 23. Union Point. |
| 8. Eleven Mile. | 24. Glacier Point. |
| 9. Chinguapin. | 25. Sentinel Hotel, Yosemite Village. |
| 10. Grouse Creek. | 26. Site of proposed new Hotel. |
| 11. Fort Monroe | 27. Three Brothers. |
| 12. Inspiration Point. | 28. Foot of "Short Trail" to Glacier Point |
| 13. Artist Point. | 29. El Capitan. |
| 14. Old Inspiration Point | 30. Lookout Point. |
| 15. Stanford Point. | 31. Ostrander Lake. |
| 16. Crocker Point. | 32. Crescent Lake. |



KEY

TO OUTLINE MAP OF YOSEMITE VALLEY and Adjacent Peaks

The elevations given below are from the maps of the United States Geological Survey. These maps do not always agree. The variations, however, are seldom considerable. Where they occur, the latest authority, "Topographic Map of Yosemite National Park," 1920, has been followed as far as available. For the immediate Valley district, the "Map of Yosemite Valley," 1907-18, gives a number of bench marks not reported on the larger sheet.

The figures indicate height above sea-level. For height above the floor of Yosemite Valley, deduct 3,960 ft., the elevation of the pier near the Sentinel Hotel. For waterfalls, the "drop" is given, as well as the elevation above sea-level.

1. Artist Point, 4,701 feet.
2. Inspiration Point, 5,291.
3. Old Inspiration Point, 6,603.
4. Stanford Point, 6,659.
5. Crocker Point, 7,090.
6. Dewey Point, 7,316.
7. Bridal Veil Fall, top, 4,787; drop, 520.
8. Cathedral Rocks, 6,638.
9. Cathedral Spires, 6,114.
10. Taft Point, 7,503.
11. The Fishes.
12. Sentinel Rock, 7,046.
13. Union Point, 6,314.
14. Glacier Point, 7,297.
15. Sentinel Dome, 8,262.
16. Glacier Point Hotel.
17. Vernal Fall, top, 5,949; drop, 317.
18. El Capitan Cliff, 6,224.
19. Illfouette Fall, top, 5,816; drop, 376.
20. Nevada Fall, top, 5,910; drop, 594.



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21. Mt. Broderick, 6,705.
22. Liberty Cap, 7,072.
23. Little Yosemite, 6,150.
24. Mt. Starr King, 9,166.
25. Mt. Clark, 11,006.
26. Foerster Peak, 12,062.
27. Electra Peak, 12,462.
28. Rodgers Peak, 13,006.
29. Mt. Lyell, 13,090.
30. Mt. McJure.
31. Mt. Florence, 12,507.
32. Half Dome, 8,337.
33. Clouds Rest, 9,924.
34. Parker Peak, 12,850.
35. Mt. Gibbs, 12,700.
36. Tenaya Peak, 10,700.
37. Mt. Watkins, 8,235.
38. Indian Rock, 8,526.

39. Basket Dome, 7,602.
40. Leaning Tower, 5,863.
41. North Dome, 7,531.
42. Washington Column, 5,912.
43. Mirror Lake, 4,096.
44. Camp Curry.
45. Kennyville.
46. Royal Arches, 5,500.
47. Indian Camp.
48. Proposed Hotel and Bungalows.
49. Yosemite Lodge.
50. Yosemite Point, 6,935.
51. Yosemite Falls: Top of Upper Fall, 6,525; drop, 1,430. Top of Lower Fall, 4,420; drop, 320.
52. Lost Arrow.
53. Three Brothers, 7,773 (Eagle Peak).

54. El Capitan: Brow, 7,042; summit, 7,649.
55. Ribbon Fall (dry in summer), top, 7,008; drop, 1,612.
56. Sentinel Hotel, Yosemite Village, 3,964.
57. Fort Monroe (Junction of Pohono Trail and Wawona Road, 5,510.
58. Garage (Yos. Natl. Park Co.), 8,146.
59. Lake Tenaya, 8,146.
60. Dana Mountain, 13,050.
61. Tuolumne Meadows (Soda Springs), 8,594.
62. Tioga Pass, 9,941.
63. Cathedral Peak, 10,933.
64. Grey Peak, 11,580.
65. Garage (Camp Curry).

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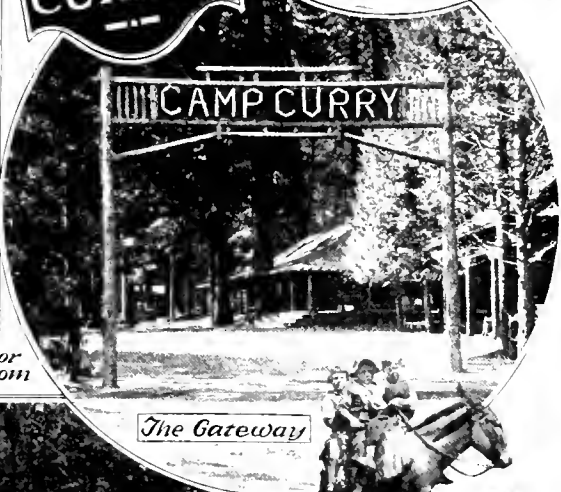
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